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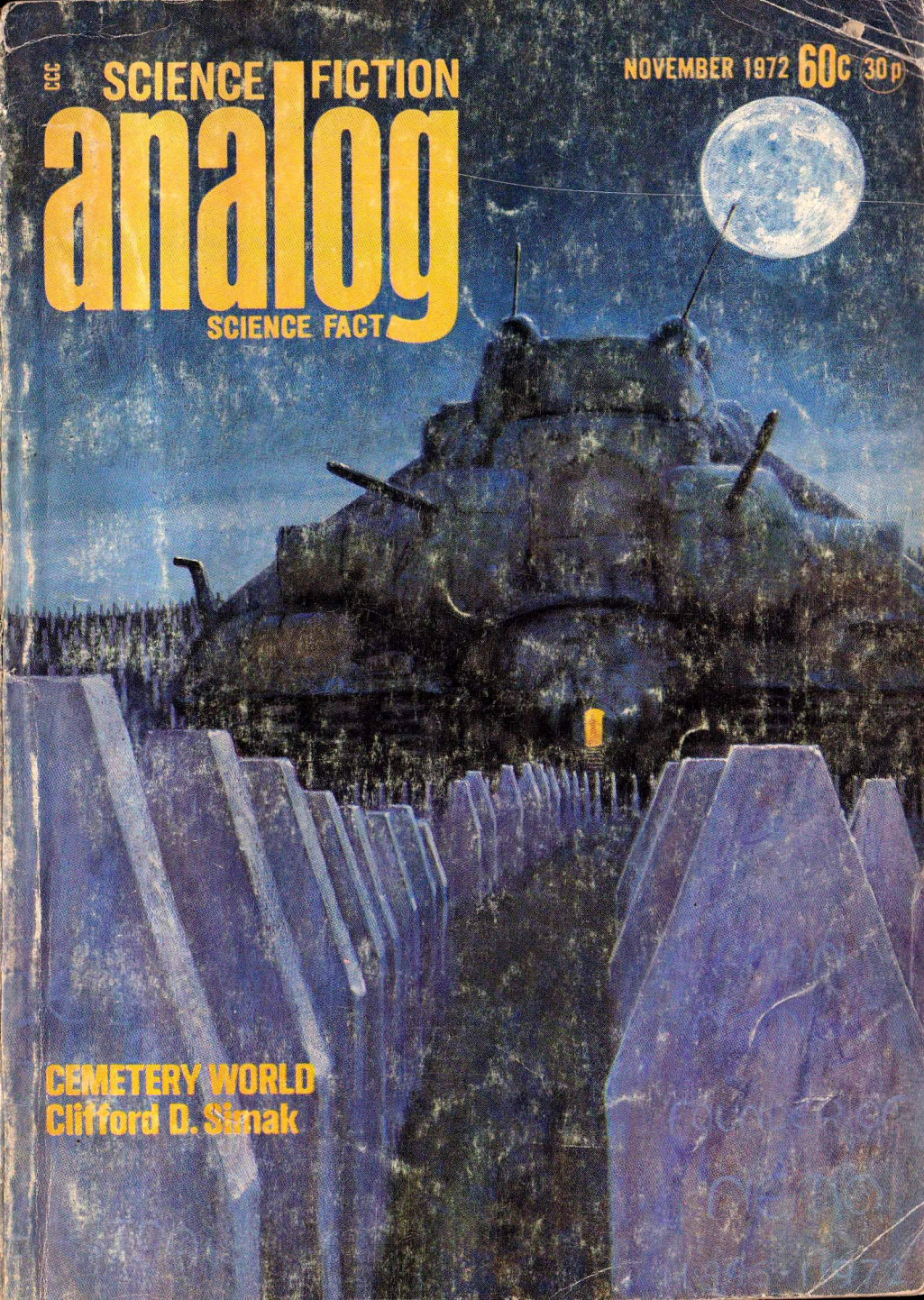

CEMETERY WORLD
Clifford D. Simak

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SHORT STORIES

SCIENCE FACT

READER'S DEPARTMENTS

LEGALIZE POT

editorial

Of the many people who have influenced my life, two of the most important have been John Campbell and Arthur Kantrowitz. And for the same reason: they taught me a lot about how to think. Not what to think; how to.

Dr. Kantrowitz was my boss for a dozen years, as Director of Avco Everett Research Laboratory and a Vice President and member of the Board of Directors of Avco Corporation. In many ways he is like John Campbell—physically big, an imposing figure in any setting, and a man of strong opinions.

Also like Campbell, Kantrowitz has given considerable thought to the way science works—and sometimes fails to work—in this nation.

Like many big-time scientists, Kantrowitz has been intimately involved in the interplay between science and government. But he's done more than sit on advisory panels and committees. He's carefully observed the way science and politics mix in this country, and he's come up with what looks like a better way to handle the job.

In our Federal Government today there are many advisors who are scientists. Most Government agencies now have "Chief Scientists" installed on their organization chart, in a neat little box tucked off to one side of the agency's director. These scientists, for the most part, give advice. They do not formulate policy. They have little or no staff. They have even less power. In most cases they are nothing but window dressing.

There have been times, for example, when the Science Advisor to the President of the United States hasn't seen his boss for months on end. And certainly the scientific advice most Presidents get has been weighed as a distant third behind politics-as-usual and economic pressures. So, although much lip service has been given to the employment of scientists as high-level advisors, these scientists have had very little to do with formulating or carrying through any actual Government policies.

Of course, some Government

agencies are highly science-directed. NASA has more Ph.D.'s than the average university (although some of these degrees, rumor has it, have been purchased from correspondence schools). There are strong research and development groups within the various military branches, in the Environmental Protection Agency, the National Oceanic and Atmospheric Agency, the National Institute of Health, and the National Science Foundation, to name a few.

But at the very top, where policy is formulated and budgets are planned, science is a distant cousin to the family of politicians in the White House and Congress. A poor relation, in fact, who has to go around every year with his hat in his hand and beg for money. Even the National Science Foundation is being treated these days more like a seedy, needy relative than an organization that can help point out new directions in foreign and domestic policies.

The situation in Russia is very different. The top scientist in the Kremlin is Vladimir A. Kirillin, a physicist. He is a Vice Premier of the Soviet Union and Chairman of the State Committee on Science and Technology. His position is roughly analogous to a cross between an American cabinet office and the Vice Presidency. Scientists and engineers pepper the policy-making and administrative staffs of most Russian bureaus, as was pointed out by C. P. Snow long before Sputnik. And their handling of scientific matters, their use of science to further national goals, their ability to select scientific goals and reach them, has been much more effective, dollar-for-dollar, than our own.

One of the basic problems we have is that American scientists are relegated to the role of advisors. But underlying that problem is an even deeper one: When the Government asks scientists for advice, it usually asks the wrong kind of question. The scientists are asked for opinions on questions that are a mixture of science and politics, rather than scientific questions pure and simple.

For example, in the 1960's the Government wanted to decide if it should risk billions of dollars on the development of an Anti-Ballistic Missile system. The scientists were asked, "Should we build an ABM system?" Some thought yes and some thought no. The public and the world were treated to the spectacle of America's leading physicists and engineers arguing vehemently with each other *over politics.* The scientists were almost totally in agreement that the ABM system being proposed would not protect the nation from a determined Russian attack. They were not debating the technical issue. And in a nonscientific debate, a scientist's opinion is no more cogent or rational than a street cleaner's.

If the question had been, "Is it technically possible to build an ABM system that will stop a full-scale Russian ICBM attack?" the scientists' answer would have been a resound-

ing, "No." *Then* the political and economic issues could have been discussed: Do we want to build a system that will forestall a simple, cheap Chinese attack? Should the money be spent on other things? Would a half-built ABM system make a good bargaining "chip" at disarmament negotiations? How many jobs would it produce? What if the Russians do and we don't? Is it moral?

The reason why we see scientists arguing with each other—and often making ridiculous claims—over issues such as hydrogen bombs, DDT, underground nuclear tests, SST's, pollution and whatnot, is that the arguments are mixtures of scientific and nonscientific issues.

Kantrowitz has suggested that such matters be clearly divided into the science part and the nonscience part. The scientists should be asked for an opinion on the scientific part only. That's the only area where they have any special expertise. They can also make their opinions heard on the nonscience side of the issue—but as private citizens, not as experts. Because they're not experts outside of their scientific specialties.

Over the centuries, the scientific method has evolved as a very sound technique for amassing and evaluating physical evidence. Kantrowitz wants the scientific decisions on national issues to be made by a court of scientists, which would operate very much like a court of law. The evidence would be rigorous, not emotional ravings and moanings. There would be advocates for both sides of the technical question, and a panel of judges elected by their scientific peers to sift and weigh the evidence presented.

If the evidence were not decisive, more research would be called for. And—most important of all—the decision of the scientific court would be made public. For the public has not only a right to know such decisions, it *must* know them if it's to decide intelligently whether or not the Government is acting wisely.

Scientists are not unemotional automatons, any more than a shoe clerk or an opera singer. But the scientific method can be employed under conditions approximating those of a court of law, to rationally determine what the physical realities of the situation might be. The approximation to reality might be very weak, as it is right now in some aspects of subnuclear theory and most aspects of pollution problems. Or it might be very strong, good enough to risk your life on, as we all do every day, from commuter to astronaut.

Under the carefully controlled conditions of a "court of science," the technical side of questions of mixed scientific and political importance can be decided upon. As Einstein once remarked, "God may be subtle, but He's not perverse." Nature isn't equivocal. Something either is or isn't, although our power to

discern between the two isn't always equal to the task. But in most cases, it should be possible for a group of scientists who are conversant with the field in question to come up with a firm answer: Yes, it is technically possible to build an H-bomb. No, the projected ABM system will not stop a full-scale missile attack. The global pollution effects of a large fleet of SST's are unknown at present, and SST's should not be allowed in commercial operation until these effects are determined. DDT can be harmful to all living creatures in certain food chains, and new ways of controlling insect pests should be developed.

These are the kinds of answers that scientists can give.

Now—what about legalizing marijuana?

First, what are the known medical-chemical facts about marijuana?

To begin with, marijuana comes from the plant *Cannabis sativa,* which also yields hashish and a drug called ganja. The active narcotic agent in all three of these drugs is delta-one-tetrahydrocannabinol (TCH). One marijuana cigarette will typically put about 2.5 milligrams of TCH into the smoker's bloodstream; this is usually enough to give him a "high."

Until the turn of this century, marijuana was used by physicians all over the world for a variety of purposes, including relief from pain and

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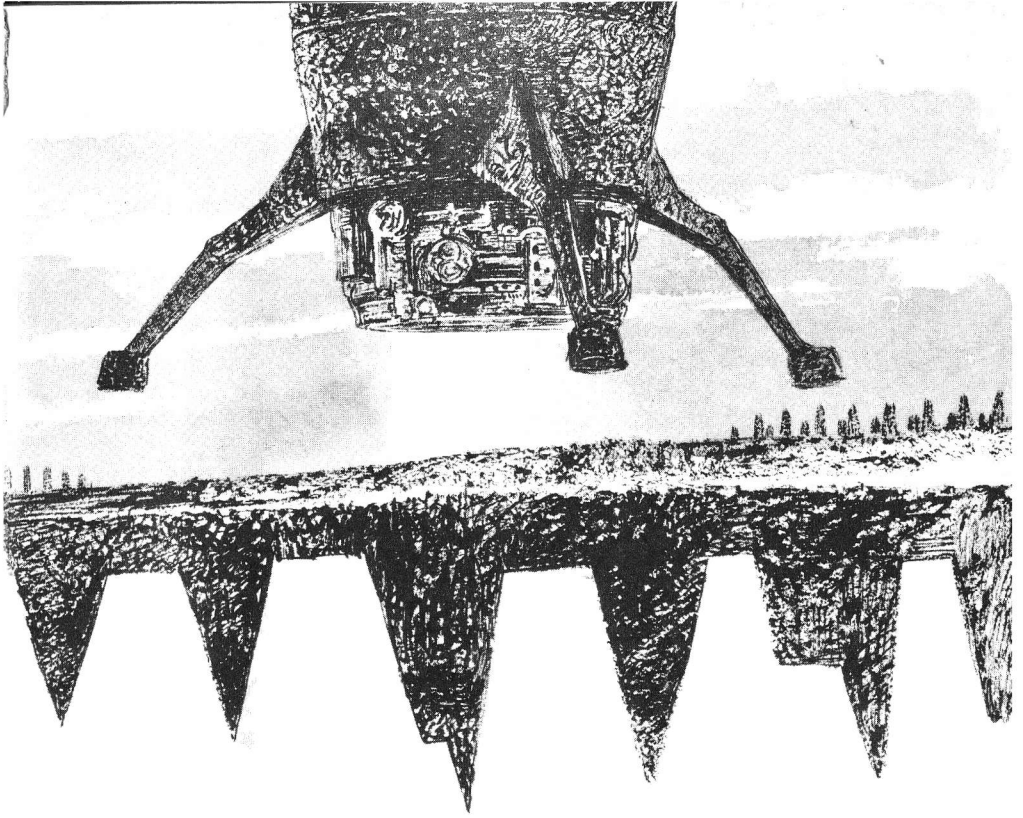
CEMETERY WORLD

JOHN SCHOENHERR



(Part One of Three Parts.) To Mother Earth
the star-flung humans returned for their final rest.
But the worldwide Cemetery was
something far more sinister than a burial ground.
And far more dangerous.

CLIFFORD D. SIMAK

I

The Cemetery stretched away in the morning light, a thing of breathless beauty. The rows of gleaming monuments swept across the valley and covered all the slopes and hills. The grass, mowed and clipped with precise devotion, was an emerald blanket that gave no hint of the rawness of the soil into which it thrust its roots. The stately pines, planted in the aisles that ran between the rows of graves, made soft and moaning music.

"It gets you," said the captain of the funeral ship.

He thumped his chest to show me exactly where it got him. He was an oaf, this captain.

"You remember Mother Earth," he told me, "all the days you're gone, all the years in space and on the other planets. You call up in your mind exactly what it's like. Then you land and open up the port and walk out on its surface and it hits you, suddenly, that you've remembered only half of it; it is too big and beautiful to hold it all in mind."

Behind us, on its pad, the funeral ship still sizzled with the heat it had picked up in making planetfall. But the crew was not waiting for the heat to dissipate. Far up its black sides ports were swinging open and cranes were cranking out, with the clank and clatter of the running chains, for the unloading of the cargo. From a long, low building which I took to be a staging shed, vehicles were scuttling across the field to receive the caskets.

The captain paid no attention to what was going on. He stood staring at the Cemetery. He seemed fascinated with it. He made an all-inclusive gesture at it.

"Miles and miles of it," he said. "Not only here in ancient North America, but in other places. This is just a corner of it."

He wasn't telling me anything that I didn't know. I had read all there was to read of Earth. I had viewed and listened to every scrap of tape bearing on the planet that I could lay my hands upon. I had dreamed of Earth for years and studied it for years and finally was here and this great clown of a captain was making a silly sideshow of it. As if he, personally, might own it. Although that, perhaps, was understandable, for he was Cemetery.

He was right, of course, about this being but one small corner of it. The monuments and the velvet carpeting of grass and that stately marching of the pines swept on for miles and miles. Here in North America and in the olden isle of Britain and the continent of Europe, in northern Africa and China.

"And every foot of it," the captain said, "as well-kept and tended, as beautiful and peaceful, and as solemn as this small corner of it."

"And what about the rest of it?" I asked.

The captain swung angrily toward me. "The rest of it?" he asked.

"The rest of Earth. It's not all Cemetery."

"It seems to me," the captain said, somewhat sharply, "that you've asked that before. You seem obsessed with it. The thing to understand is that the Cemetery is the only part of it that counts."

And that was it, of course. In all the recent literature of Earth—recent being the last thousand years or so—there was seldom any mention, anywhere, of the rest of Earth. The Earth was Cemetery, if one excepted those few places of historic or of cultural interest that were so highly advertised and promoted by the Pilgrim Tours, and even in the case of the Pilgrim attractions one gained the impression that they were set aside and preserved for future generations by Cemetery generosity. Aside from that there was no mention, or only fleeting mention, of any other Earth—as if all the rest of Earth were no more than waiting ground that in the course of time would become a part of Cemetery, as if it were no more than lonely, empty terrain so long untenanted that even the memories of ancient times had long since been erased.

The captain continued to be severe with me. "We shall unload your freight," he told me, "and store it in the shed, where you can reach it easily. I'll ask the men to be sure not to mix it with the caskets."

"That is kind of you," I said. I was disenchanted with this captain. I had seen too much of him—on the third day out I'd seen too much of him. I had done my best to keep away from him, but that is hard to do when you're aboard a funeral ship and technically are the captain's guest, although I had paid rather handsomely to become his guest.

"I hope," he said, still speaking in a slightly outraged tone, "that your freight does not contain anything of a seditious nature."

"I was not aware," I told him, "that the status of Mother Earth, Inc., was such as to allow sedition."

"I did not ask you," he said. "I did not inquire too closely. I had taken you to be a man of honor."

"Honor did not enter into our arrangement," I said. "It was of a purely monetary nature."

Perhaps, I told myself, I should not have made any mention of the rest of Earth. We had talked of it before, of course, and I could see, even from the first, that it was a very touchy subject. I could have suspected that much from all that I had read and I should have kept my mouth shut. But it was a thing that was very close to me, the conviction that Old Earth, even in ten thousand years, could not have become an entirely faceless planet. One who went to look, I was convinced, still would find old scars, old triumphs, ancient memories written in the dust and stone.

The captain had turned to walk away, but I asked another question. "This man," I said, "the manager. The one I am to see."

"His name," said the captain, stiffly, "is Maxwell Peter Bell. You'll find him over there, in the administration building."

He pointed toward the gleaming massiveness of a great white building at the far end of the field. A road ran out to reach it. It would be a fairly long hike, but I would enjoy walking, I told myself. There was no means of transportation in sight. All the cars that had come out from the staging shed were lined up waiting for the caskets from the ship.

"That other building over there," the captain said, pointing once again, "is the hotel operated by the Pilgrim Tours. You will probably be able to find accommodations there."

Then, having done his duty by me, the captain went stalking off.

The hotel, a ground-hugging structure of not more than three stories high, was a great deal farther off than the administration building. Other than the two buildings and the ship standing on the pad, the entire place was empty. There were no other ships upon the field and other than the cars waiting by the ships, no traffic.

I started for the building. It would be pleasant, I thought, to stretch my legs, good to feel solid ground underneath my feet, good to breathe pure air again after months in space. And good to be on Earth. There had been many times I had despaired of ever getting here.

Elmer, more than likely, would have his nose all out of joint at my failing to uncrate him as soon as we made planetfall. It would have made good sense to do so, for if he were uncrated he could be setting up the Bronco while I was seeing Bell. But I would have had to wait around until the crates had been unloaded and taken to the shed and I was anxious to be doing something, anxious to get started.

I wondered, as I walked along, just why I should be calling on this Maxwell Peter Bell. A courtesy call, the captain had told me, but that didn't quite hold water. There had been damn little courtesy connected with this trip; there had, rather, been hard cash, the last of Elmer's lifelong savings. It was, I thought, as if Cemetery were some sort of government, entitled to diplomatic courtesy from everyone who might come visiting. But it was no such thing at all. It was a simple business, coldly cynical in nature. For a long, long time, in my study of Old Earth, my regard for Mother Earth, Inc., had been very, very low.

II

Maxwell Peter Bell, manager of Mother Earth, Inc., North American Division, was a pudgy man who wanted to be liked. He sat in his worn, stodgy, well-upholstered chair behind the heavy, shining desk in the penthouse office atop the administration building. He rubbed his hands together and smiled almost tenderly at me and I would not have been

surprised if the round, soft brownness of his eyes had begun to melt and run down his cheeks, leaving chocolate stains.

"You had a pleasant trip?" he asked. "Captain Anderson made you comfortable?"

I nodded. "As comfortable as possible. I am appreciative, of course. I did not have the money to buy passage on a Pilgrim ship."

"You must not think of appreciation," he insisted gently. "It is we who should be glad. There are few persons of the arts who evince an interest in this Mother Earth of ours."

In his nice, slick way he was laying it on just a trifle thick, for over the years there had been many, as he called them, "persons of the arts" who had paid attention to the Earth, and in every case under the very polished and maternal patronage of Mother Earth itself. Even if one had not known of the patronage, it could have been suspected. Most of their work read, looked or sounded like something a highly-paid press relations outfit would have fabricated to advertise the Cemetery.

"It is pleasant here," I said, more to be making conversation than for any other reason.

I didn't know that I was asking for it, but I was. He settled down comfortably in his chair, like a brooding hen ruffling out her feathers over a clutch of eggs.

"You heard the pines, of course," he said. "There's a song to them. Even from up here, when a window happens to be open, you can hear them singing. Even after thirty years of hearing them, I listen by the hour. It is the song of an eternal peace that can be achieved in its totality nowhere else but Earth. At times it seems to me that it is not the song of pines and wind alone, nor yet alone the sound of Earth. Rather, it is the song of scattered Man gathered home at last."

"I hadn't heard all that," I said. "Perhaps in time I may. After I have listened a little longer. That is what I'm here for."

I might just as well have kept quiet. He wasn't even listening. He didn't want to listen. He had his piece to speak, his snow job to be done, and he was intent on that and nothing else.

"For more than thirty years," he said, "I have bent every thinking moment to the great ideals of the Last Homecoming. It is not a job that can be accepted lightly. There have been many men before me, many other managers sitting in this chair, very many of them, and every one of them a man of honor and of sensitivity. It has been my job to carry on their work, but not their work alone. I must, as well, uphold the great traditions that have been fostered through the entire history of this Mother Earth."

He slumped back in his chair and his brown eyes became softer, if that were possible, and slightly watery.

"At times," he told me, "it is no easy matter. There are so many cir-

cumstances against which a man must need contend. There are the insinuations and the whispered rumors and the charges that are hinted, but never brought out in the open, so that one may cope with them. I suppose that you have heard them."

"Some of them," I said.

"And believed them?"

"Some of them," I said.

"Let's not beat about the bush," he said, a little gruffly. "Let us say immediately that Mother Earth, Incorporated, is a cemetery association and Earth a cemetery. But it is neither a moneymaking fraud nor a pious imposition, nor a high-pressure sales promotion scheme to retail at tremendous profit large pieces of worthless real estate. Naturally, we operate as a business. It is the only way it can be done. It is the only way we can offer our services to the human galaxy. All of this calls for an organization that is vaster than one can easily imagine. Because it is so vast, it is necessarily loose. There is no such thing as maintaining tight control over the entire operation. There always exists the chance that we, here in administration, are unaware of a lot of actions we would not willingly condone.

"It might be better handled," he admitted, "if we followed the standard modern business practices of this age, employing the cyborg concepts and the psychodynamics other businesses couldn't get along without. But we are, I am afraid, rather stubbornly old-fashioned and, I would suspect, somewhat on the fuddy-duddy side. You must consider that we are an ancient enterprise, deeply rooted in the past, and by our very nature, ultraconservative. There are even times when we congratulate ourselves on resistance to change, pretending that the resistance represents a basic honesty and trustworthiness which nowadays is not too often found. And you must understand, as well, that we are highly specialized and have no real competition, so there is no pressure for us to change our ways.

"Yet, despite all this, we do well enough. We push our enterprise rather forcefully. We employ a large corps of public relations specialists to promote our concepts. We necessarily must advertise to the far corners of the areas peopled by humanity. We cheerfully concede that we have sales representatives on all planets occupied by humans. But you must consider this—that in pushing our business so forcefully we are conferring a great benefit upon the human race on at least two levels."

"Two levels," I said, astonished—astonished by the man rather than by his large flow of words. "I had thought . . ."

"The personal level," he said. "That was the one you thought of. And it, of course, is the prime consideration. Believe me, there is a world of comfort in knowing that one's loved ones have been committed, once life is done, to the sa-

cred keeping of the soil of Mother Earth. There is a deep satisfaction in knowing that one's self, when the time shall finally come, will also be laid to rest amid the hills of this lovely planet where mankind first arose."

I stirred uneasily in my chair. I was ashamed for him. He made me uncomfortable and I resented him as well. He must, I thought, consider me an utter fool if he thought that this flow of flowery, syrupy words would lay to rest any doubts I might have of Mother Earth, Inc., and convert me to Cemetery.

"Aside from this," he said, "there is a second level perhaps of even greater service. We in Mother Earth, I earnestly believe, serve as a sort of glue that holds the concept of the race intact. Without the concept of Mother Earth, Man would have become a footless wanderer. He'd have lost his racial roots. There would have been nothing to tie him to this comparatively tiny speck of matter revolving about a very common star. No matter how slim the cord may be, it seems to me essential that there be something to bind mankind together, some consideration that gives all men a certain thing in common. To serve in this wise, what could be better than a sense of personal association with the planet of their racial origin."

He hesitated for a moment and sat there staring at me. He may have expected some response after his fluent exposition of such noble thoughts. If so, I disappointed him.

"So Earth is a vast galactic cemetery," he went on after it became apparent I was not going to respond. "One must understand, however, it is something more than a common burial ground. It is, as well, a memorial and a memory and a tie that makes all mankind one, no matter where the individual man may be. Without our work, Earth long ago would have died from the memory of Man. It is not inconceivable that under other circumstances the star where Man arose might have become by now a matter of great academic concern and pointless argument, with expeditions blindly groping for some shadowy evidence that would help pin down that solar system where mankind got its start."

He tipped forward in his chair and put his elbows on his desk.

"I bore you, Mr. Carson?"

"Not at all," I told him. And it was the truth. He was not boring me. He fascinated me. It seemed impossible that he could, in good conscience, believe this flowery rubbish.

"Mr. Carson," he said. "But the first name? The first name now escapes me."

"Fletcher," I said.

"Oh, yes, Fletcher Carson. And you, of course, have heard the stories. About how we overcharge, how we fool the people and high-pressure them, and how . . ."

"Some of the stories," I admitted, "have come to my attention."

"And you thought they might be true."

"Mr. Bell," I said, "I do not see the point—"

He cut me off. "There have been certain excesses on the part of some of our representatives," he said. "It may be that at times the enthusiasm of our copywriters may have given rise to advertisements that were somewhat more flamboyant than would be dictated by good taste. But by and large we have made an honest effort to maintain an essential dignity in keeping with the responsibility that has been placed upon our shoulders.

"Every pilgrim who has visited Mother Earth will testify that there is nothing more beautiful than the developed portions of our project. The grounds are landscaped, in the most tasteful manner, with evergreen and yew, the grass is tended with a loving care and the floral beds are the most exquisite . . . but, Mr. Carson, you have seen all this."

"A glimpse of it," I said.

"To illustrate the kind of trouble we must face," he told me in what seemed a sudden rush of confidence, as if somehow I had betrayed some sympathy, "a salesman of ours in a far sector of the galaxy caused to circulate, several years ago, a rumor that Mother Earth was running out of room and would soon be full and that those families who wished to have their dead interred here would be well advised to immediately reserve those few remaining lots that were still available in the Cemetery before they were filled."

"And that, of course," I said, "could not possibly be true. Or could it, Mr. Bell?"

I knew, of course, that it couldn't be. I was just needling him, but he didn't seem to notice.

He sighed. "Certainly it isn't true. Even those persons who heard it should have known it wasn't. They should have known it was a most malicious rumor and shrugged it off. But a lot of them went running to complain about it and there was a most messy investigation of the whole affair, causing us no end of trouble, both mental and financial. The worst part of it is that the rumor is still reverberating throughout the galaxy. Even now, on some planets out there, it is still being whispered. We try to stamp it out. Whenever it comes to our attention we try to deal with it. We've been emphatic in our denials, but it seems to do no good."

"It still may sell plots for you," I pointed out. "If I were you, I would not try too hard to stamp it out."

He puffed out his cheeks. "You do not understand," he said. "Fairness and utmost honesty have always been our guides. And in view of that we do not feel that we should be held to strict accountability for the actions of that one sales person. Because of the distances involved and the resultant difficulties in communication, our organization table is, of necessity, a rather loose affair."

"Which brings up the question," I said, "of the rest of Earth, the part of it that is not Cemetery. What might it be like? I am very anxious . . ."

He waved a chubby hand, dismissing not only the question, but the rest of Earth.

"There is nothing there," he said. "Just a wilderness. An utter wilderness. All that is significant on the planet is the Cemetery. For all practical purposes, the Earth is Cemetery."

"Nevertheless," I said, "I would like . . ." But he cut me off again and went on with his lecture on the trials of operating Cemetery.

"There is always," he declared, "the question of our charges, always with the implication that they are excessive. But let us, for a moment, consider the costs that are involved. The mere cost of maintaining an organization such as ours staggers the imagination. Add to this the cost of operating our fleets of funeral ships, which make their constant rounds to the many planets, gathering in the bodies of the late departed and returning them to Earth. Now add to this the cost of our operations here on Mother Earth and you'll arrive at a total which fully justifies our charges.

"Few family members, you must understand, care to experience the inconvenience necessary to accompany their loved ones on the funeral ship. Even if they did, we could not offer many of them such accommodations. You have had some months of it and you know that traveling on a funeral ship is no luxury cruise. The cost of chartered ships runs too high for all but the very wealthy and the arrival of the Pilgrim ships, which are not cheap to travel on, does not, as a rule, coincide with the arrival of the funeral ships. Since the family members most often are not able to attend the service of commitment to the sacred soil, we must take care of all the traditional considerations. It is unthinkable, of course, that one be given to Mother Earth without an appropriate expression of sorrow and of human loss. For that reason we must maintain a large corps of pallbearers and of mourners. There are also the florists and the grave diggers, the monument makers and the gardeners, not to forget the pastors. The pastors are a case in point. There are, as you must realize, quite a lot of pastors. In the process of spreading to the stars, mankind's religions have splintered yet and yet again, until now there are thousands of sects and creeds. But despite this, it is the proud boast of Mother Earth that no body is placed within the grave without the precise officiation of the loved one's exact and peculiar sect. To accomplish this, we must maintain a great number of pastors, each qualified in his particular faith, and there are many cases where some of those affiliated with the more obscure sects are called upon no more than a couple of times a year. Still, so that they may be available when

the need arises, we must pay their salaries all the year around.

"It is true, of course, that we could effect certain economies. We could realize a substantial savings if we used mechanical excavators for the digging of the graves. But here we stand foursquare and solid in a great tradition and in consequence our human grave diggers number in the thousands. There would be a saving, too, if we were content to use metal markers for the graves, but here, too, we subscribe to tradition. Each marker in the entire Cemetery is carved by hand from the very rocks of Mother Earth.

"There is yet another thing which many are prone to pass over without understanding. There will come a day—far distant, but still it will come—when Mother Earth is filled, when every foot of ground has been consecrated with the beloved dead. Then our income will cease, but there will still remain the duty and the cost of perpetual care. So to this end each year we must add to the fund for perpetual care, insuring that at no time, so long as Earth shall stand, will ruin or neglect obliterate the monuments to the everlasting memory which has been established here."

"This is all very well," I told him, "and I am glad you told me. But would you mind, I wonder, saying why you told me?"

"Why," he said in some astonishment that I should ask, "just to clear the air. To set the record straight. So that you might realize the problems that we face."

"And so that I might know your deep sense of duty and your firm devotion."

"Yes, that as well," he said, quite unabashed and without any shame at all. "We want to show you all there is to see. The pleasant little villages where our workers live, the beauty of our many woodland chapels, the workshops where the monuments are carved."

"Mr. Bell," I said, "I am not here to take a guided tour. I am not a pilgrim."

"But surely you'll accept the small assistances and the little courtesies it would be our pleasure to extend."

I shook my head, I hope not too mulishly. "I must go on my own. It's the only way that it will work. I and Elmer and the Bronco."

"You and Elmer and the what?"

"The Bronco."

"The Bronco? I do not understand."

"Mr. Bell," I said, "you'd have to know the history of the Earth, and some of its old legends to really understand."

"But the Bronco?"

" 'Bronco' is an old Earth term for horse. A special kind of horse."

"This Bronco is a horse?"

"No, it's not," I said.

"Mr. Carson, I am not entirely sure I understand who you are or what you mean to do."

"I'm a compositor operator, Mr.

Bell. I intend to make a composition of the planet Earth."

He nodded sagely, all doubt cleared from his mind. "Oh, yes, a composition. I should have known at once. You have the look of a sensitive. And you could have chosen no better subject or no better place. Here on Mother Earth you'll find the inspiration that is nowhere else. There is a certain fleeting quality to this planet that has so far escaped the telling. There is music in the very warp and weave of it . . ."

"Not music," I told him. "Not entirely music."

"You mean a composition isn't music?"

"Not in this sense. A composition is a great deal more than music. It is a total art form. It includes music, but it includes as well the written and the spoken word, sculpture, painting, song."

"You mean you do all this?"

I shook my head. "Actually I do little of it. Bronco is the one that really does it."

He flapped his hands. "I am afraid," he said, "that I have become confused."

"Bronco is a compositor," I told him. "It absorbs the mood, the visual impact, the underlying nuances, the sounds, the shape, the form. It takes all these and turns out a product. Not an entirely finished product, but the tapes and patterns for the product. I work with it; the two of us work together. For a time, I suppose you could say, I become a part of it. It picks up the basic materials and I furnish interpretation, although not all the interpretation. That also is shared between us. It becomes, I fear, a bit hard to explain."

He shook his head. "I have never heard of anything like this. It is new to me."

"It is a fairly new concept," I told him. "It was developed on the planet Alden only a couple of centuries ago and has been in the process of refinement ever since. No two of the instruments are ever alike. There is always something that can be done to make the next one better. It is an open-ended project when you settle down to design a compositor, which is an awkward name for it, but no one has thought of a better one."

"But you call this one Bronco. There must be something in the name . . ."

"It's like this," I said. "The compositor is rather large and heavy. It is a complex mechanism and there are many rather delicate components that require heavy shielding. It is not something that one could drag around; it has to be self-propelling. So while we were about it, we built a saddle on it so a man could ride."

"By 'we' I suppose you mean yourself and Elmer. How does it happen Elmer is not with you now?"

"Elmer," I told him, "is a robot and he is in a crate. He traveled on board the ship as freight."

Bell moved uneasily, protesting. "But Mr. Carson, you must know. Surely you must know. Robots are

not allowed on Mother Earth. I am afraid we must . . ."

"In this case, you have no choice," I said. "You cannot refuse him entry to the planet. He is a native of the Earth and this is something neither you nor I can claim."

"A native! It's impossible. You must be jesting, Mr. Carson."

"Not in the least. He was fabricated here. In the days of the Final War. He helped build the last of the great war machines. Since then he has become a free robot and, according to galactic law, holds all the rights a human has, with a very few exceptions."

Bell shook his head. "I am not sure," he said. "I am not sure at all . . ."

"You need not be sure," I said. "I am. I checked into the law, most thoroughly. Not only is Elmer a native, but in the meaning of the law he is native-born. Not fabricated. Born. Back on Alden there is a very legal document that attests to all of this and I have a copy with me."

He did not ask to see the copy.

"For all intents," I said, "Elmer is a human being."

"But surely the captain would have questioned . . ."

"The captain didn't care," I said. "Not after the bribe I paid him. And in case the law is not enough, I might point out that Elmer is all of eight feet tall and very, very tough. What is more, he is sentient. He wouldn't let me turn him off when I nailed him in the crate. I'd hate to think of what might happen if someone other than myself opened up that crate."

Bell eyed me almost sleepily, but there was a wariness behind the sleepiness. "Why, Mr. Carson," he asked, "do you think so badly of us? We appreciate your coming, your having thought of us. Any aid that Mother Earth can give is yours if you only mention it. If there should be financial problems . . ."

"There are financial problems, certainly. But we seek no aid."

He persisted. "There have been occasions when we extended monetary grants to other persons of the arts. To writers, painters . . ."

"I have tried as plainly as I can," I said, "to indicate that we want no ties to Mother Earth or to the Cemetery. But you deliberately persist in your misunderstanding. Must I put it bluntly?"

"No," he said, "I would think there is no need. You are laboring under a romantic misapprehension that there is more to Earth than the Cemetery and I tell you, sir, there is nothing else. Earth is worthless. It was destroyed and abandoned ten thousand years ago and it would have been forgotten long ago if it had not been for us. Will you not reconsider? There would be much mutual benefit to the both of us. I am intrigued by this new art form that you have described."

"Look," I said, "you might as well understand this. I don't propose to turn out a Cemetery work. I'm not up for hire as a press agent for

Mother Earth. And I owe you nothing. I paid your precious captain five thousand credits to haul us here and . . ."

"Which was less," Bell said angrily, "than you would have paid on a Pilgrim ship. And a Pilgrim ship would not have taken all your freight."

"I thought," I said, "that it was sufficient payment."

I didn't say good-bye. I turned around and left. Walking down the steps of the administration building, I saw a ground car parked in front of the steps, in the traffic circle. It was the only car in sight. The woman who sat in it was looking straight at me, as if she might have known that I was in the building and had been waiting for me.

The car was a screaming pink and that color, pink, made my thoughts go back to Alden, where it had all started.

III

It had been early evening and I'd been in the garden watching the purple cloud that hung above the pink horizon (for Alden was a pink world), listening to the evensong of the temple birds that had gathered in the little grove of trees at the garden's foot. I was listening with some pleasure, when trampling down the dusty path that led across the pink and sandy plain came this great eight-foot monstrosity, lurching along with his awkward stride like a drunken behemoth. Watching him, I hoped that he would pass by and leave me with the evening and the birds, for I was in no mood for strangers. I was considerably depressed and there was nothing I wanted quite so much as to be left alone so I'd have a chance to heal. For this had been the day when I'd finally come face-to-face with hard reality and had known that the dream of Earth was dead unless I could get more money. I knew how little chance I had of getting money. I had scraped up all I could and borrowed all I could and would have stolen if there'd been any chance of stealing. I'd had a hard look at it all and knew I wasn't going to be able to build the kind of compositor I wanted and the sooner I got reconciled to all of this, the better it would be.

I sat in the garden and watched this great monstrosity lurching down the path and I tried to tell myself that he was headed elsewhere and would not stop. But that was purely wishful thinking, for my garden was the only place he could be heading for.

He looked like a worker robot, perhaps a heavy construction robot, although what a heavy construction robot would be doing on a planet such as Alden I could not imagine. Heavy construction is just one of the many things that are not done on Alden.

He came lurching up and stopped beside the gate. "With your per-

mission, sir," he said, very politely.

"Welcome to my home," I told him, through my teeth.

He unlatched the gate and came through, stopping to make sure it was latched again before coming on. He came over to me and hunkered down as gently as he could and hissed a little at me as a matter of politeness. Have you ever heard a three-ton robot hiss? I tell you, it's uncanny.

"The birds are doing nicely," said this hunk of metal, squatting there beside me.

"They do very well," I said.

"Allow me," said the robot, "to introduce myself."

"If you would please," I said.

"My name is Elmer," said the robot. "I am a free machine. I was given freedom papers many centuries ago. I have been my own man ever since."

"Well," I said, "congratulations. How are you making out?"

"Very well," said Elmer. "I just sort of wander, going here and there."

I nodded, believing him. You saw them now and then, these free and wandering robots who had gained, technically, the status of a human after many years of servitude.

"I have heard," said Elmer, "that you're going back to Earth."

Not to the Earth, but back to Earth—that was the way of it. After more than ten millennia, one still went back to Earth. As if the human race had left it only yesterday.

"You have been misinformed," I said.

"But you have a compositor . . ."

"A basic instrument," I told him, "that needs a million things to do the kind of job that should be done. It would be pitiful to go to Earth with such a pile of junk."

"Too bad," said Elmer. "There is a glorious composition waiting on the Earth. There is only one thing, sir . . ."

He stuttered to a halt, embarrassed for some reason I could not detect. I waited, not wishing to embarrass him further by saying anything.

"What I meant to say, sir—and it may not be in my province to say anything at all—is that you must not allow yourself to be trapped by the Cemetery. The Cemetery is no part of the Earth. It is something that has been grafted onto the Earth. Grafted, if I may say so, with a colossal cynicism."

I pricked up my ears at that. Here, I told myself with more surprise than I would admit, was someone who was in agreement with me. I took a closer look at him in the gathering dusk. He wasn't much to look at. His body was old-fashioned, at least by Alden standards: a clumsy thing, all brawn, an unsoftened lusty body, and his head piece was one upon which no effort had been expended to make it sympathetic. But rough and tough as he might seem, his speech was not the kind of language one would ex-

pect from a hulking, outdated labor robot.

"I am somewhat surprised," I told him, "and at the same time gratified, to find a robot who has an interest in the arts, especially in an art so complicated."

"I have tried," said Elmer, "to make myself a whole man. Not being a man, I suppose, might explain why I tried so hard. Once I got my freedom papers and was given in the process the status of a human, I felt it incumbent on myself to try to be a human. It's not possible, of course. There is a great deal of machine still left in me . . ."

"But composition work," I said, "and myself—how did you know I was at work on an instrument?"

"I am a mechanic, see," said Elmer. "I've been a mechanic all my life, by nature. I look at a thing and I know instinctively how it works or what is wrong with it. Tell me what kind of machine you want built and the chances are that I can build it for you. And when you come right down to it, a compositor is about as complicated a piece of mechanism as one can happen on and, more than that, it is far from finished yet. It is still in the process of development and there is no end to the ways that one can go. I see you looking at these hands and wondering how I can do the kind of work a compositor requires. The answer is that I have other hands, very special kinds of hands. I screw off my everyday hands and screw on whatever other kind is needed. You have heard of this, of course?"

I nodded. "Yes. And specialized eyes, I suppose you have those as well."

"Oh, yes, indeed," said Elmer.

"You find a compositor a challenge to your mechanical ability?"

"Not a challenge," said Elmer. "That's a foolish word to use. I find satisfaction in working with complicated mechanisms. It makes me more alive. It makes me feel worthwhile. And you asked how I heard about you. Well, just a passing remark, I guess—that you were building a compositor and planned to go back to Earth. So I inquired around. I found out you had studied at the university, so I went there and talked to people. There was one professor who told me he had great faith in you. He said you had the soul for greatness; he said you had the touch. His name, I think, was Adams."

"Dr. Adams," I said, "is old now and forgetful and a very kindly man."

I chuckled, thinking of it—of this great, bumbling, earnest Elmer clumping across the faery campus and stumbling down the venerated, almost sacred, halls, hunting out professors from their academic lairs to ask them insistent, silly questions about a long-gone student that many of them, no doubt, had trouble in recalling.

"There was yet another professor," said Elmer, "who impressed me greatly and I had a long talk with

him. He was not in the arts, but in archaeology. He said he knew you well."

"That would be Thorndyke. He is an old and trusted friend."

"That's the name," said Elmer.

I was a bit amused, but somewhat resentful, too. What business did this blundering robot have to be checking up on me?

"And you are now convinced," I asked, "that I am fully capable of building a compositor?"

"Oh, most assuredly," he said.

"If you have come with the hope of being hired, you have wasted your time," I said. "Not that I don't need the help. Not that I wouldn't like to have you. But I've run out of money."

"It wasn't that entirely, sir. I would, of course, be delighted to work on it with you. But my real reason was I want to go back to Earth. I was born there, you see; I was fabricated there."

"You were what?" I yelled.

"I was forged on Earth," said Elmer. "I'm a native of the Earth. I would like to see the planet once again. And I thought that if you were going . . ."

"Once again," I said, "and slow. Do you really mean that you were forged on Earth? In the olden days?"

"I saw the last of Earth," said Elmer. "I worked on the last of the war machines. I was a project manager."

"But you would have worn out," I said. "You would be worn out by now. A robot can be long-lived, of course, but . . ."

"I was very valuable," Elmer pointed out. "Ship room was found for me when men began going to the stars. I was not just a robot. I was a mechanic, an engineer. Humans needed robots such as I to help establish their new homes far in space. They took good care of me. Worn parts were replaced, I was kept in good repair. And since I gained my freedom I have taken good care of myself. I have never bothered with the external body. I have never changed it. I have kept it free of rust and plated, but that is all. The body does not count, but the internal working parts. Although now it is impossible to get shelf replacements. They are no longer in stock, but must be placed on special order."

What he said had the ring of truth to it. In that long-gone moving day when, in a century or so, men had fled the Earth, a wrecked and ruined planet, because there was nothing left to keep them there, they would have needed robots such as Elmer. But it was not only this. Elmer had the sound of truth in him. This was no tall tale, I was sure, to impress the listener.

And here he sat beside me, after all the years, and if I would only ask him, he could tell me of the Earth. For it all would still be with him—all that he had ever seen or heard or known would be with him still, for

robots do not forget as biologic creatures do. The memories of the ancient Earth would be waiting within his memory core, waiting to be tapped, as fresh as if they had been implanted only yesterday.

I found that I was shaking—not shaking outwardly, or physically, but within myself. I had tried to study Earth for years and there was so little left to study. The records and the writings had been lost and scattered and in those cases where they still existed it was often in only fragmentary form. In that ancient day when men had left the Earth they had gone out too fast, fleeing for the stars, to give much thought to the preservation of the heritage of the planet. On thousands of different planets some of that heritage might still remain, preserved because it had been forgotten, hidden in old trunks or packing boxes tucked beneath the eaves. But it would take many lifetimes for one to hunt it out, and even could one find it, more than likely a good part of it would be disappointing—mere trivia that would have no actual bearing on the questions that bobbled in one's mind.

But here sat a robot that had known the Earth and could tell of Earth—although perhaps not as much as one might hope, for those must have been desperate, busy days for him, with much of Earth already gone.

I tried to frame a question and there was nothing I could think of that it seemed he could answer. One after another the questions came to mind and each one was rejected because it did not fit into the frame of reference of a robot engaged in building war machines.

And while I tried to form a proper question he said something that knocked the questions completely from my mind.

"For years," he said, "I have been wandering around from one job to another and the pay was always good. There's nothing, you understand, that a robot really needs, that he'd feel called to spend his money on. So it has just piled up. And here, finally, is something I'd like to spend it on. If you would not be offended, sir . . ."

"Offended about what?" I asked, not entirely catching the drift of all his talk.

"Why," he said, "I'd like to put my money into your compositor. I think I might have enough that we could finish it."

I suppose I should have got all happy, I should have leaped to my feet and shouted out my joy. I just sat cold and stiff, afraid to move, afraid that if I moved I might scare it all away.

I said, still stiff and cold, "It's not a good investment. I would not recommend it."

He almost pleaded with me. "Look, it is not just the money. I can offer more than that. I'm a good mechanic. Together, the two of us could put together an instrument that would be the best one ever made."

IV

As I came down the steps, the woman sitting at the wheel of the pink car spoke to me.

"You are Fletcher Carson, are you not?"

"Yes," I said, completely puzzled, "but how did you know that I was here? There is no way you could have known."

"I've been waiting for you," she said. "I knew you'd be on the funeral ship, but it took so long to get here. My name is Cynthia Lansing and I must talk with you."

"I haven't too much time," I said. "Perhaps a little later."

She was not exactly beautiful, but there was, even at first sight, something engaging and extremely likable about her. She had a face that fell just short of being heart-shaped, her eyes were quiet and calm, her black hair fell down to her shoulders; she wasn't smiling with the lips, but her entire face was ready to break into a smile.

"You're going out to the shed," she said, "to uncrate Elmer and Bronco. I could drive you out there."

"Is there anything," I asked, "that you don't know about me?"

She did smile then. "I knew that as soon as you got in you'd have to pay a courtesy call on Maxwell Peter Bell. How did you make out?"

"In Maxwell Peter Bell's book I achieved the rating of a heel."

"Then he didn't take you over?"

I shook my head. I didn't quite trust myself to speak. How the hell, I wondered, could she know all she seemed to know? There was only one place she could have learned any of it at all—on Alden at the university. Those old friends of mine, I told myself, might have hearts of gold, but they were blabbermouths.

"Come on, get in," she said. "We can talk on the way out to the shed. And I want to see this wondrous robot, Elmer."

I got into the car. There was an envelope lying in her lap and she handed it to me.

"For you," she said.

It had my name scrawled across the face of it and there was no mistaking that misshapen scrawl. Thorney, I told myself. What the hell did Thorney have to do with Cynthia Lansing ambushing me as soon as I got to Earth?

She started up the car and headed down the driveway. I ripped the letter open. It was a sheet of official University of Alden stationery and in the upper left-hand corner was neatly printed: William J. Thorndyke, Ph.D., Department of Archaeology.

The letter itself was in the same scrawl as the name upon the envelope. It read:

> Dear Fletch: The bearer of this letter is Miss Cynthia Lansing and I would impress upon you that whatever she may tell you is the truth. I have examined the evidence and I would pledge my rep-

utation that it is authentic. She will be wanting to accompany you on your trip and I would take it as the greatest favor you could do me if you should bear with her and supply her with all cooperation and assistance that is possible. She will be taking a Pilgrim ship to Earth and should be there and waiting for you when you arrive. I have placed some departmental funds at her disposal and you are to make use of them if there is any need. All that I need tell you is that her presence on the Earth has to do with what we talked about that last time, when you came to see me just before you left.

I sat with the letter in my hand and I could see him, as he had been, on that last time I had seen him, in the firelit, littered room that he called his study, with books shelved to the ceiling, with the shabby furniture, the dog curled upon the hearth rug, the cat upon its cushion. He had sat on a hassock and rolled the brandy glass between his palms, and he had said, "Fletch, I am certain I am right, that my theory's right. The Anachronians were not galactic traders, as so many of my colleagues think. They were observers; they were cultural spies. It makes a deal of sense when you look at it. Let us say that a great civilization had the capacity to roam among the stars. Let us say that in some manner they could spot a planet where an intellectual culture was rising or about to rise. So they plant an observer on that planet and keep him there, alert to developments that might be of value. As we know, cultures vary greatly. This can be observed even among the human colonies that were planted from the Earth. Even a few centuries are enough to provide some variations. The variations are much greater, of course, among those planets that still have or at one time had alien cultures—alien as opposed to human. No two groups of intelligences ever go at anything in parallel manner. They may arrive, eventually, at the same result, or at an approximation of the same result, but they go about it differently, and in the process each develops some capability or some concept which the other does not have. Even a great galactic culture would have developed in this fashion, and because it did develop in this fashion there would be many approaches, many concepts, many abilities which it bypassed or missed along the way. It would seem, this being true, that it would have been worth the while of even our great galactic culture to learn about and have at hand for study those cultural developments it had missed, perhaps had never even thought of. Probably not more than one in ten of these missed developments would be applicable to their culture, but that one in ten might be most important. It might give a new dimension, might make them a more well-rounded and more solid culture. Let us say, which is not true, of course,

that Earth had been the only culture that dreamed up the wheel. Even the great galactic culture had missed the wheel, had gone on to its greatness on some other principle that left the lack of the wheel unnoticed. Still, would it not seem likely that knowledge of the wheel, even at a much later date, might be of value? The wheel is such a handy thing to have."

I came back to the present. I still clutched the letter in my hand. The car was nearing the shed. The funeral ship stood on its pad, but there was no sign of the vehicles that had been unloading the cargo. The work must all be done.

"Thorney says that you are expecting to go with us," I said to Cynthia Lansing. "I don't know if that'll be possible. We'll be roughing it. Camping out in all kinds of weather."

"I can rough it. I can camp."

I shook my head.

"Look," she protested, "I gambled everything I had on this, to be here when you landed. I scratched up every credit that I had to pay the outrageous fare on a Pilgrim ship . . ."

"Thorney said something about some funds. A grant."

"I didn't have quite enough for the fare," she said. "I used part of it for that. And I've been waiting for you to arrive, staying at the Pilgrim Inn, which isn't cheap. There is very little left. Really, nothing left . . ."

"That's too bad," I said. "But you knew it was a gamble. You had no reason to believe . . ."

"But I did," she said. "You are as broke as I am."

"Meaning what?"

"Meaning you haven't got the money to get back to Alden once you have your composition."

"I know that," I said, "but if I have the composition . . ."

"No money," she said, "and Mother Earth not about to make it easy for you."

"There is that," I said, "but I can't see how taking you along . . ."

"That is what I have been trying to tell you. This may sound silly to you but . . ."

Her words ran out and she sat there looking at me. Her face no longer looked as if it were about to smile.

"Damn you," she said, "why don't you say something? Why don't you help me just a little? Why don't you ask me what I have?"

"All right. What is it that you have?"

"I know where the treasure is."

"For the love of Christ, what treasure?"

"The Anachron treasure."

"Thorney is convinced," I told her, "that the Anachronians had been on Earth. He wanted me to watch for any possible clues to their being here. It was a fool's errand, of course, as he spelled it out to me. The archaeologists aren't even sure there was such a race. Their planet has never been found. All that has been found are fragments of inscriptions on half a dozen planets,

fragmentary inscriptions found among the inscriptions and the sherds of the native culture. Some evidence, although it seems to me shaky evidence, that at one time members of this supposedly mysterious race lived on other planets—perhaps as traders, which is what most archaeologists believe, or as observers, which is what Thorney believes, or for some other reason, neither as traders nor observers. He told me all of this, but he never mentioned treasure."

"But there was a treasure," she said. "It was brought from olden Greece to olden America in the Final War. I found an account of it and Professor Thorndyke . . ."

"Start making some sort of sense," I said. "If Thorney is right, they weren't here for treasure. They were here for data, to observe . . ."

"For data, sure," she said, "but what about the observer? He would have been a professional, wouldn't he? A historian, perhaps far more than a historian. He would have recognized the cultural value of certain artifacts—the ceremonial hand ax of a prehistoric tribe, a Grecian urn, Egyptian jewelry . . ."

I crammed the letter into my jacket pocket, jumped out of the car. "We can talk about this later," I said. "Right now I have to turn Elmer loose so we can start setting up the Bronco."

"Am I going with you?"

"We'll see," I said.

How the hell, I wondered, could I keep her from going? She had Thorney's blessing; she maybe did have something about the Anachronians, perhaps even about a treasure. And I couldn't leave her here, flat broke—for if she wasn't quite broke yet, she would be if she stayed on at the inn and there was no place else for her to stay. God knows, I didn't want her. She would be a nuisance. I was not on a treasure hunt. I had come to Earth to put together a composition. I hoped to capture some of the feel of Earth—Earth minus Cemetery. I couldn't go off chasing treasure or Anachronians. All that I'd ever told Thorney was that I'd keep my eyes open for clues and that didn't mean going out to hunt for them.

I headed for the open door of the shed, with Cynthia trailing at my heels. Inside the shed it was dark and I paused for a moment to let my eyes become accustomed to the darkness. Something moved and I made out three men—three workmen from the looks of them.

"I have some boxes here," I said. There were a lot of boxes, the piled cargo off the funeral ship.

"Right over there, Mr. Carson," said one of them. He gestured to one side and I saw them—the big crate enclosing Elmer and the four crates in which we had boxed the Bronco.

"Thanks," I said. "I appreciate your keeping them separate from the rest. I'd asked the captain, but . . ."

"There's just one little matter," said the man. "Handling and storage."

"I don't get it. Handling and storage?"

"Sure, the charges. My men don't work for free."

"You're the foreman here?"

"Yeah. Reilly is the name."

"How much is this storage?"

Reilly reached into his back pocket and hauled forth a paper. He studied it fixedly, as if making sure he had the figures right.

"Well," he said, "it runs to four hundred and twenty-seven credits, but let us say four hundred."

"You must be wrong," I told him, trying to keep my temper. "All you did was unship the crates and haul them in here, and, as for storage, they've been here only an hour or so."

Reilly shook his head, sadly. "I can't help that. Them's the charges. You either pay them or we hold the cargo. Them's the rules."

The other two men had moved up silently, one to either side of him.

"It's all ridiculous," I protested. "This must be a joke."

"Mister," said the foreman, "it isn't any joke."

I didn't have four hundred credits and I wouldn't have paid it if I had, but neither was I going to tackle the foreman and the husky stevedores standing with him.

"I'll look into this," I said, trying to save face, having no idea what I could do next. They had me cold, I knew. Although it wasn't them; it was Maxwell Peter Bell. He was the one who had me cold.

"You do that, Mister," said Reilly. "You just go ahead and do it."

I could go storming back to Bell and that was exactly what he wanted. He expected that I would and it would be all right, of course, and all would be forgiven, if I accepted a Cemetery grant and did Cemetery work. But I wasn't going to do that, either.

Cynthia said, behind me, "Fletcher, they're ganging up on us."

I turned my head and there were more men, coming in the door.

"Not ganging up on you," said Reilly. "Just making sure that you understand. There can't be no outlander come in here and tell us what to do."

From behind Reilly came a faint, thin screeching sound and the instant that I heard it, I pegged it for what it was, a nail being forced out of the wood that held it.

Reilly and his henchmen swung around and I let out a yell. "All right, Elmer! Out and at them!"

At my yell the big crate seemed to explode, the planks nailed across its top wrenched and torn away, and out of the crate rose Elmer, all eight feet of him.

He stepped out of the crate, almost fastidiously.

"What's the matter, Fletch?"

"Go easy on them, Elmer," I said. "Don't kill them. If necessary, just rough them up a bit."

He took a step forward and Reilly and the two men backed away.

"I will not harm them," Elmer said. "I'll just brush them to one side Who is it you have with you, Fletch?"

"This is Cynthia," I said. "She'll be going with us."

"Will I?" asked Cynthia.

"Look here, Carson," Reilly roared, "don't you try no rough stuff . . ."

"If I were you," said Elmer, "I would not linger here." He took a rapid step toward them. They turned and ran, piling out the door.

Elmer went past us rapidly. They were closing the door and just before it closed, he thrust a hand into the crack, clutched the door and wrenched it open, then butted it with his shoulder. It crumpled and hung.

"That will take care of it," said Elmer. "Now the door won't close. They were about to lock us in, can you imagine that? Now if you'll tell me, Fletch, what is going on."

"Maxwell Peter Bell," I said, "doesn't like us. Let's get going on the Bronco. The quicker we are out of here . . ."

"I have to get the car," said Cynthia. "I have all the supplies and my clothes in it."

"Supplies?" I asked.

"Certainly. Food and the other stuff we'll need. I don't suppose you brought anything along. That's one reason I'm so broke. I spent the last of my money . . ."

"You go and get the car," said Elmer. "I'll keep watch. No one will lay a hand on you."

"You thought of everything," I said. "You were pretty sure . . ."

But she was running out the door. There was no sign of Reilly or his men. She got into the car and drove it through the door.

Elmer went to the other crates and rapped on the smaller one. "That you, Bronco?" he asked. "You inside of there?"

"It is I," said a muffled voice. "Elmer, is that you? Have we reached the Earth?"

"I didn't know," said Cynthia, "that Bronco was a sentient or that he could talk. Professor Thorndyke didn't tell me that."

"He is sentient," said Elmer, "but of low intellect. He is no mental giant."

He said to Bronco, "You all right?"

"I am fine," said Bronco.

"We'll have to get a pinch bar," I said.

"There is no need," said Elmer. He balled a fist and smashed it down on one corner of the crate. The wood crumpled and splintered and he reached his fingers into the hole and tore loose a board.

"This is easy," he said. "I wasn't sure I could break out of my crate. The mechanics of the situation were not too favorable. There was little room and not much leverage. But when I heard what was going on out here . . ."

"Is Fletch here?" asked Bronco.

"Fletch is here," said Elmer, "and

now there is another member of the expedition. There are four of us."

He went on ripping boards off the crate.

"Let's get to work," he said.

We got to work, the two of us.

Bronco was a complicated thing and not easy to assemble. There were a lot of parts and all of them had to be phased together with little tolerance. But the two of us had worked with Bronco for almost two years and we knew him inside out. At first we'd used a manual, but now there was no need of one. We'd thrown away the manual when it had become so tattered it was of little use, and when Bronco, himself, refined and redesigned and tinkered here and there, had become a contraption that bore but small resemblance to the model of the manual. The two of us, working together, knew every piece by heart. We could have field-stripped Bronco and put him back together in the dark. There was no waste motion and no need of conference or direction. Elmer and I worked together like two machines. Inside of an hour we had Bronco put together.

Assembled, he was a crazy thing to look at. He had eight jointed legs that had an insect look about them. Each of them could be positioned at almost any angle. There were claws he could unsheathe to get a better grip. He could go anywhere, on any kind of ground. He could damn near climb a wall. His barrel-like body, equipped with a saddle, afforded good protection to the delicate instruments that it contained. It carried a series of rings that allowed the strapping of loads upon his back. He had a retractable tail that was made up of a hundred different sensors and his head was crowned with another weird sensor assembly.

"I feel good," he said. "Are we leaving now?"

Cynthia had unloaded the supplies from the car.

"Camping stuff," she said. "Concentrated food, blankets, rain gear, stuff like that. Nothing fancy. I didn't have the money to buy fancy stuff."

Elmer began heaving the boxes and crates on Bronco's back, cinching them in place.

"You think you can ride him?" I asked Cynthia.

"Sure I can. But what about yourself?"

"He's riding me," said Elmer.

"No, I'm not," I said.

"Be sensible," said Elmer. "We may have to run for it to get out of here. They may be laying for us."

Cynthia went to the door and looked out. "There's no one in sight," she said.

"How do we get out of here?" asked Elmer. "The quickest way out of the Cemetery."

"You take the road west," she told him, "past the administration building. Twenty-five miles or so and the Cemetery ends."

Elmer finished packing the supplies on Bronco. He took a final look

around. "I guess that's all," he said. "Now, Miss, up on Bronco."

He helped her up. "Hang on tight," he cautioned her. "Bronco's not the smoothest thing to ride."

"I'll hang on," she said. She looked scared.

"Now you," Elmer said to me. I started to protest, but didn't because I knew it would do no good. And, besides, riding Elmer made a lot of sense. If we should have to run for it, he could go ten times faster than I could. Those long metal legs of his could really eat up ground.

He lifted me and put me on his shoulders, astride his neck. "You hang onto my head to balance yourself," he said. "I'll hold onto your legs. I'll see you don't fall off."

I nodded, not too happy. It was damned undignified.

We didn't have to run for it. There was no one around except one plodding figure far to the north walking down an aisle between the stones. There must have been people watching us; I could almost feel their eyes. We must have made a strange sight—Cynthia riding that grasshopper of a Bronco, with bales and boxes tied all over him, and myself up there, jiggling and swaying atop the eight-foot Elmer.

We didn't run or even hurry, but we made good time. Bronco and Elmer were good travelers. Even at their normal walking pace, a man would have had to run to keep up with them.

We went clattering and lurching up the road, past the administration building and out into the main part of the Cemetery. The road was empty and the land was peaceful. Occasionally, far off, I would sight a little village, nestled in a cove—a slender finger of a steeple pointing at the sky and a blur of color that was the rooftops of the houses. I imagined those little villages were the homes of workers employed by the Cemetery.

As I rode along, bouncing and swaying to Elmer's swinging strides, I saw that the Cemetery, for all its vaunted beauty, was in reality a dismal, brooding place. There was a sameness to it and an endless order that was monotonous and over all of it hung a sense of death and a great finality.

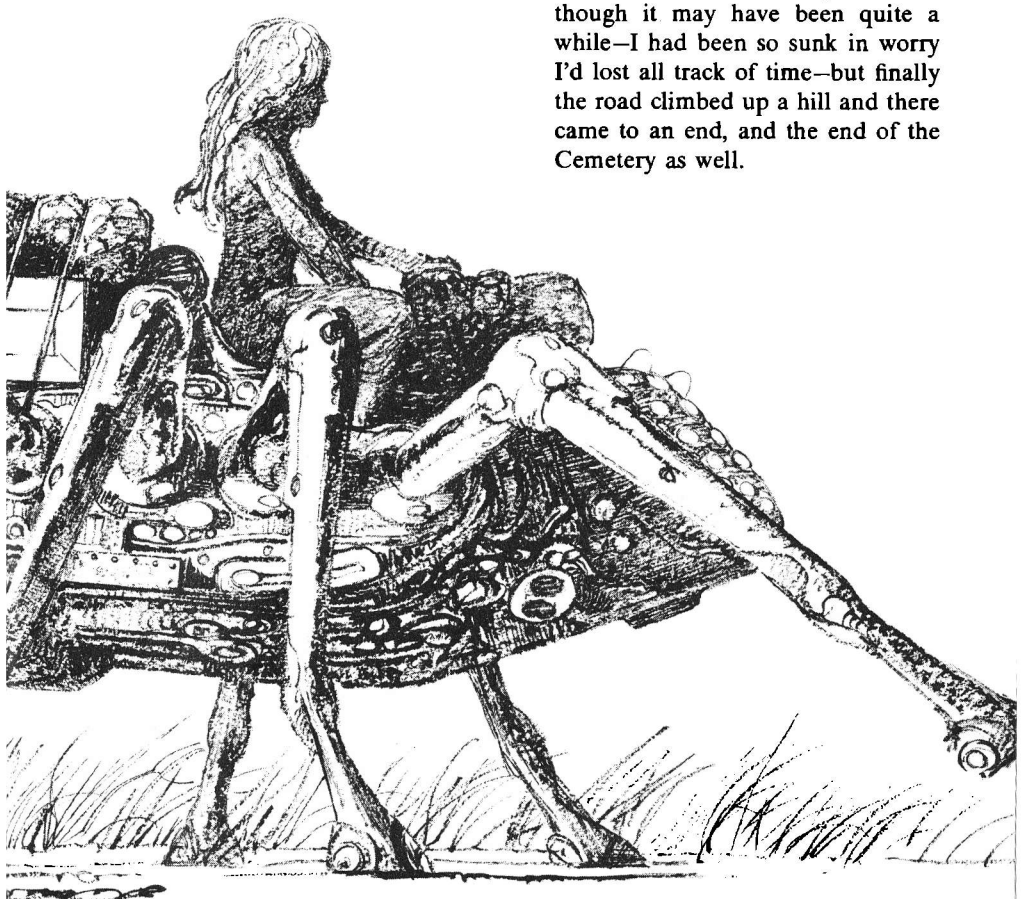
I hadn't had time to worry before, but now I began to worry. What worried me the most, strangely enough, was that Cemetery, after a fairly feeble effort, had made no real attempt to stop us. Although, I told myself, if Elmer had not been able to burst out of his crate, Reilly and his men would have stopped me cold. But as it was, it almost seemed that Bell figured he could let us go, knowing that any time he wished he could reach out and grab us. I didn't try to fool myself about Maxwell Peter Bell.

I wondered, too, if any further attempts would be made upon us. Perhaps there didn't have to be; more than likely Bell and Cemetery might

be no longer too much concerned with us. We could go wherever we wished and it would make no difference. For no matter where we went or what we did, there was no chance of leaving Earth without Cemetery's help.

I had made a mess of it, I told myself. I had gone in and played smart aleck to Bell's pompousness and had thrown away any chance I had of any sort of working relationship with Bell or Cemetery. Although, I realized, it might have made no difference no matter what I'd done. I should have realized that on Earth you played along with Cemetery or you did not play at all. The whole damn venture had been doomed from the very start.

It hadn't seemed so long to me, although it may have been quite a while—I had been so sunk in worry I'd lost all track of time—but finally the road climbed up a hill and there came to an end, and the end of the Cemetery as well.



I stared at the valley below us and the hills that climbed in serried ranks above it, sucking in my breath in astonishment at the sight of it. It was a strangely wooded land dressed in flaming color that shone like glowing fires in the sun of afternoon.

"Autumn," Elmer said. "I had forgotten that Earth had autumn. Back there you couldn't tell. All the trees were green."

"Autumn?" I asked.

"A season," Elmer told me. "A certain time of year when all the trees are colored. I had forgotten it."

He twisted his head around so he could look up at me. If he could have wept, he would have.

"One forgets so many things," he said.

V

It was a world of beauty, but of lusty, two-fisted, brooding beauty unlike the delicate, almost fragile, beauty of my world of Alden. It was solemn and impressive and there was a dash of wonder and a streak of fear intertwined into the structure and the color of it.

I sat on a moss-grown boulder beside a brawling, dark-brown stream that carried on its surface the faery boats of red and gold and yellow that were the fallen leaves. If one listened sharply he could pick out, at the edge of the throaty gurgle of the dark-brown water, the faint, far-off pattering of other leaves falling to the earth. And for all the color and the beauty, there was an ancient sadness there. I sat and listened to the liquid sliding of the water and the faint patter of the leaves, and looking at the trees, I saw that they were massive growths, exuding a sense of age, and that there was something secure and homelike and comfortable about them. There was color here and mood and sound, quality and structure, and a texture that could be felt with the fingers of the mind.

The sun was setting, throwing a fog-like dusk across the stream and trees, and there was a coolness in the air. It was time, I knew, to be getting back to camp. But I did not want to move. For I had the feeling that this was a place, once seen, that could not be seen again. If I left and then came back it would not be the same; no matter how many times I might return to this particular spot the place and feeling would never be the same, something would be lost or something would be added, and there never would exist again, through all eternity, all the integrated factors that made it what it was in this magic moment.

A stone rattled behind me and I turned to see that it was Elmer, moving through the dusk. I said nothing to him and he did not speak to me, but came and squatted down beside me and there was nothing to be said, nothing that needed to be said. I sat there, remembering all the other times like this—when there had been no need of words between

Elmer and myself. We sat as the twilight deepened and from far away came the sound of something hooting and a little later the faint sound of something that was baying. The water went on talking as the darkness deepened.

"I built a fire," said Elmer, finally. "We'll need it for cooking, but even if we had no need of it, I still would have built a fire. The Earth calls for a fire. The two of them go together. Man came up from savagery with fire. In all of man's long history he never let the fire go out."

"Is it," I asked, "the way you remember it?"

He shook his head. "Not the way I remember it, but somehow it is the way that I knew it would be. There weren't trees like these, or a stream like this. But you see one tree flaming in the autumn sun and you can imagine what it might be like with a forest of such trees. You see a stream run red and choked with filth and you know how it might be if the land were clean."

The baying sound came again and walked with chilly feet along my spine.

"Dogs," said Elmer, "trailing something. Either dogs or wolves."

"You were here," I said, "in the Final War. It was different then."

"Different," said Elmer. "Most everything was dead or dying. But there were places here and there where the old Earth still remained. Little pockets where the poison and the radiation had not settled in, places that had been struck no more than a glancing blow. Enough to let you know what it had been like at one time. The people were living mostly underground. I worked on the surface, on one of the war machines—perhaps the last such machine that was ever built. Barring the purpose of it, it was a wondrous piece of mechanism and well it might have been, for it was not machine alone. It had the body of a machine, but the brain of it was something else—a melding of machine and man, a robotic brain linked with the brains of men. I don't know who they were. Someone must have known, but I never did. I have often wondered. It was the only way, you see, that a war could still be fought. No human could go to fight that kind of war. So man's servants and companions, the machines, carried on the war. I don't know why they kept on fighting. I have often asked myself. They'd destroyed all there'd ever been to fight for and there was no use of keeping on."

He quit talking and rose to his feet.

"Let's go back," he said. "You must be hungry and so must the young lady. Fletch, I fear I am a bit confused as to why she is along."

"Something about a treasure."

"What kind of treasure?"

"I don't really know. There was no time for her to explain it to me."

From where we stood we could see the flare of the fire and we walked toward it.

Cynthia was on her knees before a bed of coals she had raked off to one side, holding a pot over the coals and stirring with a spoon.

"I hope it's decent," she said. "It's some kind of stew."

"There is no need for you to be doing that," said Elmer, somewhat miffed. "I am, when called upon, a quite efficient cook."

"So am I," said Cynthia.

"Tomorrow," Elmer said, "I'll get some meat for you. I saw a number of squirrels and a rabbit or two."

"We have no hunting equipment," I said. "We brought along no guns."

"We can make a bow," said Cynthia.

"No need of guns or bows," said Elmer. "Stones are good enough. I'll pick up some pebbles . . ."

"No one can hunt with pebbles," Cynthia said. "You can't throw straight enough."

"I can," Elmer told her. "I am a machine. I do not rely on muscles or a human eye, which marvelous as it may be . . ."

"Where's Bronco?" I asked.

Elmer motioned with his thumb. "He's in a trance," he said.

I moved around the fire so I could get a better look at him. What Elmer had said was right. Bronco was standing to one side with all his sensor apparatus out, soaking up the place.

"The best compositor there ever was," said Elmer, proudly. "He took to it like a shot. He's a sensitive."

Cynthia picked up a couple of bowls and dished up the stew. She handed one of them to me.

"Watch out; it's hot," she said.

I sat down beside her and began, cautiously, to eat. The stew was not too bad, but it was hot. I had to blow upon each spoonful of it to cool it off before I put it in my mouth.

The baying came again, and it was close now, just a hill or two away.

"Those are dogs," said Elmer. "They are chasing something. Maybe there are people here."

"Maybe just a wild pack," I said.

Cynthia shook her head. "No. I asked around a bit when I was staying at the inn. There are people out here in the wilds—or what Cemetery calls the wilds. No one seems to know too much about them, or at least wouldn't talk too much about them. As if they were beneath any human notice. The normal Cemetery-Pilgrim reaction, what you would expect. You got a taste of that reaction, Fletcher, when you went in to see Maxwell Peter Bell. You never told me how it all turned out."

"He tried to take me over. I turned him down, not too diplomatically. I know I should have been more polite, but he put my back up."

"It wouldn't have made any difference," she said. "Cemetery is not accustomed to refusal—even to polite refusal."

"Why did you bother with him at all?" asked Elmer.

"It's expected," I said. "The

Captain briefed me on it. A courtesy call. As if he were a king or prime minister or potentate or something. I couldn't have ducked it very well."

"What I don't understand," Elmer said to Cynthia, "is how you fit into it. Not that you aren't welcome."

Cynthia looked at me. "Didn't Fletcher tell you?"

"He said something about a treasure . . ."

"I suppose," she said, "I'd better tell it all. Because you have a right to know. And I wouldn't want you to think I was a simple adventuress. There is something rather shoddy about an adventuress. Do you want to listen?"

"We might as well," said Elmer.

She was silent for a moment and you could sense her settling down, getting a good grip on herself, as if she faced a difficult task and was determined that she would do it well.

"I'm an Alden native," she began. "My ancestors were among the first to settle there. The family did not prosper; it never was important in the history of the planet. Its members through the years were farmers, small tradesmen, laborers. Some of them, I guess a lot of them, went off-planet with the years, seeking fortunes that I suspect were never found. If they had been, the Alden Lansings would have heard of it, but the family legend makes no mention of it. Those who were left stayed on simply because they could not bring themselves to leave; there wasn't much there for them, but Alden is such a beautiful planet.

"I set out to make something of myself. I went to university. My father could afford part of the cost and I worked for the rest. My interest was history. I simply reveled in it. I dreamed that in time I might hold a chair in history and do learned research and write penetrating papers. And I did well in my studies. When it came time to follow one specific line of study, I found myself irresistibly impelled to the study of ancient Earth.

"My obsession with the Earth," she went on, "I am quite certain, was in part a rapport with the past, a deep concern for the old beginnings. My father's farm was only a few miles from the locality where the first Lansings had settled on Alden, or so the legend ran. Nestled in a little rocky canyon, at a point where it opened on what at one time must have been a wide, rich valley suitable for farming, was an old stone house, or what at one time had been a stone house. Large parts of it had crumbled, the very stones weathering away with time, disturbed by the small shiftings of the ground that would become significant only after many centuries. There were no stories about it. It was not a haunted house. It was too old to be a haunted house. It simply stood there. Time had made it a part of the landscape. The land on which it stood and the land around it was so poor and worthless that it interfered with nothing, so it had

escaped the tearing down and razing that is so common a fate of many ancient things. Legend said—I must admit, a very shaky legend—that it had been, at one time, the residence of a very early Lansing.

"I visited it, I suppose, because of its very oldness. Not because it may have been Lansing, but simply because it was so old—old beyond the memory of man, a structure from the deeper past. I expected nothing from it. Perhaps I would never have thought of it except in passing, or would never have visited it if it had not been for a gradual sharpening of my concern for olden things. Can you understand what I'm saying?"

"I think," I said, "I understand it far better than you may suspect. I recognize the symptoms. I have suffered most acutely from them."

"I went there," she said, "and I ran my hands along the old, roughly hewn stones and I thought of how human hands, long gone in dust, had shaped them and piled them one atop another as a refuge against the night and storm, as a home on a new-found planet. Looking through the ancient eyes of the builders, I was able to understand the attraction of the place of building, knowing why they might have chosen this particular place for the building of a house. Protection of the canyon walls from the sweeping winds, the quiet and dramatic beauty of the place, the water from the spring that still ran in a trickle from underneath a hillside rock, the wide and fertile valley (no longer fertile now) spreading just beyond the doorstep. I stood there in their stead and felt as they would have felt. I was, for a moment, them. And it didn't really matter whether they were Lansings or not; they were people, they were the human race.

"I would have been richly repaid for my time in going there if I had walked away right then. The touching of the stone, the evidence of the past would have been quite enough, but I went into the house . . ."

She stopped and waited a moment, as if gathering herself for the telling of the rest of it.

"I went into the house," she said. "I walked softly, not because of any danger, but because of the sanctity of time that hovered in that space. It was strange, the feeling that I had—or, rather, the conflicting feelings. When I first went into it I felt that I was an invader, an outsider who had no right to be there. I was intruding on old memories, on old lives, on old emotions that should have been left alone in peace, that had been there so long that they had earned the right to be left alone. I went inside, into what had been a rather large room, perhaps what you might call a living room. There was thick dust upon the floor and the dust was marked by the tracks of wild and small things and there was the odor of wild things having lived there through millennia. But as I stood

there, just inside the doorway, a strange thing happened—a feeling that I had the right to be there, that I, in a sense, belonged there, that I was coming back after a long, long time on a family visit and was a welcome visitor. For blood of my blood had lived there, bone of my bone, and the right of blood and bone is not erased by time. There was a fireplace in one corner. The chimney was gone, fallen long before, but the fireplace remained. I walked over to it and, kneeling down, touched the hearthstone with my fingers, feeling the texture of its surface through the dust. I could see the fireplace's blackened throat, blackened by the old home fires, the soot still there, resisting time and weather; and there was a moment when it seemed I could see the piled logs and the flame. And I said—I don't know if I said it aloud or only in my mind—I said, 'It is all right, I have come back to tell you the Lansings still persist.' Never for a moment confused as to whom I might be saying it. I waited for no answer. I did not expect an answer. There was no one there to answer. It was enough that I should say it. It was a debt I owed them."

She looked at me with frightened eyes. "I don't know why I tell all this," she said. "I did not intend to tell it. There is no reason I should tell you; no reason you should hear it. The facts—the facts I could tell in just a few sentences, but it seemed that they must be told in context . . ."

I reached and touched her arm. "There are some facts that can't be stated simply," I told her. "You are doing fine."

"You are certain you don't mind?"

"Not at all," said Elmer, speaking for me. "I am fascinated."

"There's not much more," she said. "There was a doorway, still intact, leading out of the room into the interior of the house and when I went into this room beyond, I saw that it must have been a kitchen once, although only part of it was there. There was a second story to the house, a part of it still standing, although all the roof was gone, having long since caved in on the rest of the structure. But above the kitchen there was no second story. Apparently the eaves of the house had extended over the kitchen and there was a pile of weathered debris lying along what had been the kitchen's outside wall, the debris from the caving eaves. I don't know how I happened to notice it—it was not easily detectable—but extending for a short distance out of one section of the debris was a squareness. It looked wrong; it didn't have the look of debris. It was dust-covered, as was everything in the house. There was no way to know that it was metal. It had no gleam. I guess it must have been the squareness of it. Debris isn't square. So I went over and tugged it out. It was a box, corroded, but still intact—the metal at no point had been

broken or worn through. I squatted there on the floor beside it and I tried to reconstruct what had happened to it and it seemed to me that at some time it had been tucked away underneath the eaves, up in the attic, and then somehow was forgotten and that it had fallen when the eaves had fallen, perhaps crashing through the kitchen roof, or perhaps, by that time the kitchen had no roof."

"So that's the story," I said. "A box with a treasure clue . . ."

"I suppose so," she said, "but not quite the way you think. I couldn't get the box open, so I carried it back to my apartment and got some tools and opened it. There wasn't much in it. An old deed to a small parcel of land, a promissory note marked paid, a couple of old envelopes with no letters in them, a canceled check or two and a document acknowledging the loan of some old family papers to the manuscript department of the university. Not a permanent loan; they were just on loan. The next day I went to the manuscript department and made inquiry. You know how manuscript departments are . . ."

"Indeed I do," I said.

"It took a while, but my status as a graduate student in Earth history and the fact that the papers, after all, were my family's papers, finally did the trick. They expected I simply wanted to study them, but by the time they were produced—I think probably that they had been misplaced and may have been difficult to locate—I was so fed up that I filed notice that I was revoking the loan and walked out with them. They were a small batch of papers, pretty small potatoes in a place like that. They had been placed in a single envelope and sealed. There was no evidence they had ever been examined; they were all haphazard and mixed up. If they had been examined, they would have been sorted and labeled, but it was fairly evident the original seal had never been broken. The whole bunch of papers had been simply filed away and forgotten."

She stopped talking and looked hard at me. I said nothing. In her own time, she'd get around to it. Maybe she had a reason for telling it like this. Maybe she had to live it all over again, not for us, but for herself, to reexamine it all again, to be certain (Once again? How many times again?) that she had not erred in judgment, that what she had done was right. I was not about to hurry her, although, God knows, I was a bit impatient.

"There wasn't much," she said. "A series of letters that shed a little light on the first human colonization of Alden—nothing startling, nothing new, but they gave one the feeling of the times. A small sheaf of rather amateurish poems written by a girl in her teens or early twenties. Invoices from a small business firm that might have been of some slight interest to an economic historian,

and a memorandum written in rather ponderous language by an old man setting down a story that he had been told by his grandfather, who had been one of the original settlers from Earth."

"And the memorandum?"

"It told a strange story," she said. "I took it to Professor Thorndyke and told him what I've just told you and asked him to read the memo and after he had read it he sat there for a time, not looking at me or the memo or anything at all and then said a word I'd never heard before—Anachron."

"What is Anachron?" asked Elmer.

"It's a mythical planet," I said, "a sort of never-never land. Something the archaeologists dreamed up, a place they theorize . . ."

"A coined word," said Cynthia. "I didn't ask Dr. Thorndyke, but I suspect it comes from *anachronism*—something out of place, very much out of place. You see, for years the archaeologists have been finding evidence of an unknown race that left their inscriptions on a number of other planets, perhaps on many other planets than they know, for their fragmentary inscriptions have been found only in association with the native artifacts . . ."

"As if they were visitors," I said, "who had left behind a trinket or two. They could have visited many planets and their trinkets would be found only on a few of them, by sheer chance."

"You said there was a memo?" Elmer asked.

"I have it here," said Cynthia. She reached into the inside pocket of her jacket and brought out a long billfold. From it she took a sheaf of folded paper. "Not the original," she said. "A copy. The original was old and fragile. It would not take much handling."

She handed the papers to Elmer and he unfolded them, took a quick look at them and handed them to me. "I'll poke up the fire," he said, "so there will be light. You read it aloud so we can all hear it."

The memo was written in a crabbed hand, the hand, most likely, of an old and feeble man. In places the writing was a little blurred, but was fairly legible. There was a number at the top of the first page—2305.

Cynthia was watching me. "The year date," she said. "That is what I took it for and Professor Thorndyke thought the same. It would be about right if the man who wrote it is who I think he was."

Elmer had poked up the fire, pushing the wood and coals together and the light was good. Elmer said, "All right, Fletch. Why don't you begin?"

So I began.

VI

2305

To my grandson, Howard Lansing:

My grandfather, when I was a

young man, told me of an event which he experienced when he was a young man of about my age and now that I am as old as he was when he told me of it, or older, I pass it on to you, but because you are still a youngster, I am writing it down so that when you have grown older you may read it and understand it and the implications of it the better.

At the time he related the happening to me he was of sound mind, with no mental and only those physical infirmities which steal upon a man as the years go by. And strange as the tale may be, there is about it, or so it has always seemed to me, a certain logical honesty that marks it as the truth.

My grandfather, as you must realize, was born on Earth and came to our planet of Alden in his middle age. He was born into the early days of the Final War when two great blocs of nations loosed upon the Earth a horror and destruction that can scarcely be imagined. During the days of his youth he took part in this war—as much a part as a man could take, for in truth it was not a war in which men fought one another so much as a war in which machines and instruments fought one another with a mindless fury that was an extension of their makers' fury. In the end, with all his family and most of his friends either dead or lost (I don't know which and I'm not sure that he did, either), he finally was among that contingent of human beings, a small fraction of the hordes that once had peopled Earth, that went out in the great starships to people other planets.

But the story he told me had nothing to do with either the war or the going out in space, but with an incident that he did not place at all in time and only approximately in space. I have the impression that it happened when he was still a comparatively young man, although I cannot remember now if he actually told me this or if I have conjectured it from some now-forgotten details of the tale itself. I freely admit that there are many parts of it that I have forgotten through the years, although the major facts of it are still sharp within my mind.

Through some circumstance which I have now forgotten (if, in fact, he ever told me), my grandfather found himself in what he called a safe zone, a little area, a pocket of geography in which through some happenstance of location with regard to topography or meteorology, the land was less poisoned, or perhaps not poisoned at all by the agents of the war, and where a man might live in comparative safety without the massive protection that was required in other, less fortunate areas. I have said he was not specific as to where this place actually had been, but he did tell me that it was at a point where a small river coming from the north flowed into a larger river, the Ohio.

I gained the impression (although

he did not tell me, nor did I question him on the point) that my grandfather at the time was not engaged in any actual task or mission, but that once he found the area, quite by accident, he simply stayed on there, taking advantage of the comparative security that it offered. Which, in view of the situation, would have made uncommonly good sense.

How long he stayed there altogether, I have no idea, nor how long he had been there when the event took place. Nor why, finally, he left. All of which, of course, is extraneous to what actually happened.

But, one day, he told me, he saw the ship arrive. There were at that time very few air-traveling ships in existence—the most of them having been destroyed—and even if there had been, they would have counted, should they be used as such, as very feeble weapons in the war then being waged. And it was, besides, a ship such as he had never seen before. I remember that he told me the manner in which it differed from ships that he had seen, but the details have grown a little fuzzy in my mind and if I tried to set them down, I know I'd get them wrong.

Being a cautious man, as all men must be in those days, my grandfather hid himself as well as he could manage and kept as close a watch as possible upon what was happening.

The ship had landed on the point of one of the hills that stood above the river, and once it had settled, five robots came out from it and another person that was not a robot—appearing, indeed, to be a man—but my grandfather, from his hiding place, had the feeling that it was not a man, but something with only the outward appearance of a man. When I asked my grandfather why he might have thought this, he was hard put to explain it. It was not the way he walked nor the way he stood nor, later, the way he talked, but there was a strangeness, perhaps a psychic scent, a subconscious triggering of the brain, that told him that this creature that was not a robot was yet not a man.

Two of the robots walked a short distance from the ship and seemed to stand as sentinels, not facing in the same direction all the time, but turning occasionally as if they were studying or sensing the terrain on every side. The rest of them began unloading a large pile of boxes and what appeared to be equipment.

My grandfather thought that he was well hidden. He was crouching in a thicket close beside the stream and was hunkered low against the ground so that his silhouette would have been broken by the branches of the thicket and, besides, it was summertime and the shrubs had leaves.

But in a very short time, even before the ship had been completely unloaded, one of the robots working at the unloading left the hilltop and came down the hillside, walking straight toward where my grandfather was hiding in the thicket. He

thought at first that it was only a coincidence that the robot should be walking toward him and he stayed very still, even breathing as shallowly as he could.

It was not a coincidence, however. The robot must have known exactly where he was. My grandfather always thought that one of the sentinels had somehow spotted him, perhaps by a thermal reading, and staying on post itself, had passed on the information that there was a watcher.

Arriving at the thicket, the robot reached down, grabbed my grandfather by the arm and jerked him out of there, then marched him up the hill.

My grandfather admitted to me that from this point onward his memory was not consecutive. While the time element of what he did remember seemed to be consecutive, not jumbled chronologically, there were gaps for which he could not account. He was convinced that before he was let go or managed to escape (although both of these, too, are conjectured—for at no time, as far as he could recall, did he have the feeling that he was being held captive) an attempt was made to erase the memories of what had happened from his mind. He believed that for a time the memory erasure was effective; it was only after he arrived on Alden that he began, in bits and pieces, to remember what had happened—as if the events had been submerged, pushed deep into his brain, and came pushing back again only after a number of years.

He did remember talking with the man that seemed to him not to be entirely a man, and the impression that he carried with him was that this creature was soft-voiced and not at all unkind, although he could not remember a single thing that was said between them, with one exception. The man (if it were a man) told him, he recalled, that he had come from Greece (there was at that time no country that was known as Greece, but at one time there had been) where he had lived for long—my grandfather remembered clearly that phrase, "for long," and thought it rather strange that it should be expressed that way. The man also told my grandfather that he had sought out a place where life would not be threatened and thought, from certain measurements or from certain other facts my grandfather did not comprehend, that he had found it there in that place where he had landed.

My grandfather also recalled that some of the equipment that had been taken from the ship was employed by the robots to drive a deep shaft into the solid rock which lay beneath the hill and, once the shaft was driven, to hollow out great chambers underground. And once this had been done, a small hut—rude on the outside, constructed of timbers and made to look as if it were old and about to tumble down, but its interior well furnished to make for comfortable living—was

built above the tunnel, which had steps going down to the rock-hewn chambers and a clever trapdoor fixed at the mouth of the tunnel so that, once closed, no one would suspect that it was there.

The boxes which had been unloaded from the ship were carried down into the chambers, except for a few that held furniture and furnishings for the hut atop the tunnel.

When one of the boxes was being carried down the steps into the chambers it slipped out of a robot's grasp, and my grandfather who—for some reason he does not recall—was in the chamber below, saw it come tumbling down the stairs and hurriedly got out of its way. It was a heavy box; but even so, as it tumbled down the stairs, it began to come apart, to be battered apart by striking on the stones, and by the time it reached the bottom of the steps it had come apart entirely so that all that it contained was either scattered on the steps or spilled out on the chamber's floor.

There was a great treasure in that box, my grandfather told me—jewel-encrusted pendants and bracelets and rings, all set with shining stones; small wheels of gold with strange markings on them (my grandfather insisted that they were gold, although how he could tell a thing was gold by simply looking at it, I do not understand); figurines of animals and birds made of precious metals and set with precious stones; a half a dozen crowns (the kind kings or queens would wear); bags that split open to loose a flood of coins, and many other things, including some vases, all of which were smashed.

The robots came rushing down the stairs to pick up all the treasure that was scattered and behind them came their master, and when he reached the bottom of the stairs he paid no attention to all the other things, but stooped and picked up some of the pieces of a shattered vase and tried to fit them back together. But he could not fit them back together, for they had been broken into too many pieces. From the few pieces that he did fit together, trying to hold all those broken pieces in their proper places, my grandfather saw that the vase had had painted pictures on it, fired into the glaze—pictures of strange men hunting even stranger beasts, or maybe they only seemed strange because they were so badly done, with no thought of perspective and without the anatomical knowledge that is basic with an artist.

The man (if it were a man) stood there with the broken pieces in his hands and his head was bent above them and his face was sad and a tear rolled down his cheek. My grandfather thought it strange that a man should weep over a broken vase.

All this time the robots were picking up the stuff and putting it in a pile and one of them went and got a basket and put it all into the basket and carried it off to be stored with all the other boxes in one of the rock-hewn chambers.

But they didn't get it all, for my grandfather, with no one seeing him, picked up a coin and secreted it about his person; and I will now wrap this coin, which he passed on to me, and put it in this envelope . . .

VII

I stopped reading and looked across the fire at Cynthia Lansing.

"The coin?" I asked.

She nodded. "It was in the envelope, wrapped in a piece of foil, a kind of foil that has not been used for centuries. I gave it to Professor Thorndyke and asked him if he'd keep it . . ."

"But did he know what it was?"

"He wasn't sure. He took it to another man, an expert on old Earth coins and such. It was an uncirculated Athenian owl, probably minted a few years after a battle fought at a place called Marathon."

"Uncirculated?" Elmer asked.

"It had not been used. There was no wear on it. When a coin is circulated it becomes smooth and dull from much handling. But aside from some deterioration due to time, this one was exactly as it had been the day that it was struck."

"And there can't be any doubt?" I asked.

"Professor Thorndyke said there could be none at all."

The baying of the dogs could still be heard beyond the ridge that rose above our camp. It was a lonely and a savage sound and I shivered as I listened to it and moved closer to the fire.

"They are after something," Elmer said. "Maybe coon or possum. The hunters are back there somewhere, listening to the dogs."

"But what are they hunting for?" asked Cynthia. "The men, I mean, the men who sent out the dogs."

"For sport and meat," said Elmer.

I saw her wince.

"This is no Alden planet," Elmer told her. "No planet soft and full of pinkness. The people who live back here in the woods are probably one-half savage."

We sat listening and the baying of the dogs seemed to move away.

"On this treasure business," Elmer said, "let us try to figure out what we have. Somewhere in this country to the west of us someone came fleeing one of Greece and hid out a bunch of boxes, some of which probably contained treasure. We know one of them did and some of the others may have. But the location might be a little hard to come by. It's indefinite. A river flowing from the north into the old Ohio. There might be quite a lot of streams coming from the north . . ."

"There was a hut," said Cynthia.

"That was ten thousand years ago. The hut must be long gone. We'd be looking for a hole, a tunnel, and that might be covered over."

"What I want to know," I said, "is why Thorney should have thought this strange character out of Greece might be Anachronian."

"I asked him that," said Cynthia, "and he said that Greece or somewhere in that area of the planet would most likely be the place an alien observer would have set up his observation post. The first settled communities of the human race were established in what was once known as Turkey. An observer would not have set up a post too close to what he wished to study. He'd want to be in a position to do some observation and then get out of there. Greece would be logical, Professor Thorndyke said. Such an observer would have had some means of rather rapid transportation and the distance between the first settlements and Greece would have been no problem."

"It doesn't sound logical to me," said Elmer, bluntly. "Why Greece? Why not the Sinai? Or the Caspian? Or a dozen other places?"

"Thorney goes on hunches as much as evidence or logic," I told them. "He has a well-developed hunch sense. He is very often right. If he says Greece, I'd go along with him. Although it would seem this hypothetical observer of ours could have moved location time and time again."

"Not if he were picking up loot all the time," said Elmer. "He'd get weighed down with it. It would be quite a job to move. He probably brought along several tons of it when he moved to the Ohio."

"But it wasn't loot," cried Cynthia. "You have to understand that it wasn't loot. Not loot in the terms of money, or in terms of whatever value the Anachronians might employ. Whatever he picked up were cultural artifacts."

"Cultural artifacts," said Elmer, "running very heavily to gold and precious stones."

"Let's be fair about it," I said to Elmer. "It might just have happened that the broken box was filled with that kind of stuff. Some of the other boxes might have been filled with arrowheads or spear points, early woven cloth, mortars and pestles."

"Dr. Thorndyke thought," said Cynthia, "that the boxes my ancestor saw contained only a small fraction of what the observer had collected. Probably only a few of the more significant items. Back somewhere in Greece, perhaps in other caverns carved into the rock, there may be a hundred times as much as was in the boxes."

"Whatever it may be, it spells out treasure," Elmer said. "Artifacts of any sort command a price, and I suppose they'd be worth even more if they were artifacts from Earth. But Earth or not, there is a booming trade in them. A lot of wealthy men—and they have to be wealthy to pay the prices asked—have collections of them. But aside from that, I understand it's chic to have an artifact or two on the mantelpiece or in a display cabinet.

I nodded, remembering Thorney, pacing up and down the room, strik-

ing his clenched fist into an open palm and fulminating. "It's getting so," he'd yell, "that an honest archaeologist hasn't got a chance. Do you know how many looted sites we've found in the last hundred years or so—dug up and looted before we ever got to them? The various archaeological societies and some of the governments have made investigations, and there is no evidence of who is doing it or where the artifacts are taken to be hidden out. We've found no trace of them or whoever might be responsible. They are looted and warehoused somewhere and then they trickle back into collectors' hands. It's big business and it must be organized. We've pushed for laws to forbid private ownership of any artifact, but we get nowhere. And because of this vandalism we are losing the only chance we have to gain an understanding of the development of galactic cultures."

The baying of the dogs had changed to excited yapping.

"Treed," said Elmer. "Whatever they were running has taken to a tree."

I reached out to the little pile of wood Elmer had brought in, laid new sticks on the fire, used another to push the spreading coals together. Little tongues of blue-tipped flame ran up from the coals to lick against the new wood. Dry bark ignited and threw out sparks. The fresh fuel caught and the fire leaped into new life.

"A fire is a pleasant thing," said Cynthia.

"Could it be," asked Elmer, "that even such as I should be warmed by such a feeble flame? I swear that I feel warmer sitting here beside it."

"Could be," I said. "You've had a lot of time to grow into a man."

"I am a man," said Elmer. "Legally, that is. And if legally, why not otherwise?"

"How is Bronco getting on?" I asked. "He should be here with us."

"He is sitting out there soaking it all up," said Elmer. "He is weaving a woodland fantasy out of the dark shapes of the trees, the sound of nighttime wind in leaves, the chuckle of the water, the glitter of the stars and three black shapes huddled at a campfire. A campfire canvas, a nocturne, a poem, perhaps a delicate piece of sculpture—he's putting it all together."

"He works all the time, poor thing," said Cynthia.

"It is not work for him," said Elmer. "It is his very life. Bronco is an artist."

Somewhere off in the dark something made a flat cracking sound and an instant later was followed by another. The dogs, which had fallen silent, resumed excited barking.

"The hunter shot whatever it was that the dogs had treed," said Elmer.

After he had spoken, no one said a word. We sat there imagining—or at least I was imagining—that scene off in the darkened woods, with the dogs

jumping about the tree, excited, the level gun and the burst of muzzle flame, the dark shape falling from the tree to be worried by the dogs.

And as I sat there listening and imagining, there was another sound, faint, far off—a rustling and a crackling. A breath of breeze came down the hollow and swept the sound away, but when the breeze died down, the sound was there again, louder now and more insistent.

Elmer had leaped to his feet. The flicker of the fire sent ghostly metallic highlights chasing up and down his body.

"What is it?" Cynthia asked and Elmer did not answer. The sound was closer now. Whatever it might be, it was heading toward us and was coming fast.

"Bronco!" Elmer called. "Over here, quick. By the fire with us."

Bronco came spidering rapidly.

"Miss Cynthia," Elmer said, "get up."

"Get up?"

"Get up on Bronco and hang on tight. If he has to run, stay low so a tree branch won't knock you off."

"What is going on?" asked Bronco. "What is all the racket?"

"I don't know," said Elmer.

"The hell you don't," I said, but he didn't hear me; if he did, he didn't answer.

The noise was much closer now. It was no kind of noise I had ever heard before. It sounded as if something was tearing the very woods apart. There were popping sounds and the shriek of tortured wood. The ground seemed to be vibrating as if something very heavy was striking it repeated hammer blows.

I looked around. Cynthia was up on Bronco and Bronco was dancing away from the fire out into the dark, not running yet, but staying limber and ready to run at a second's notice.

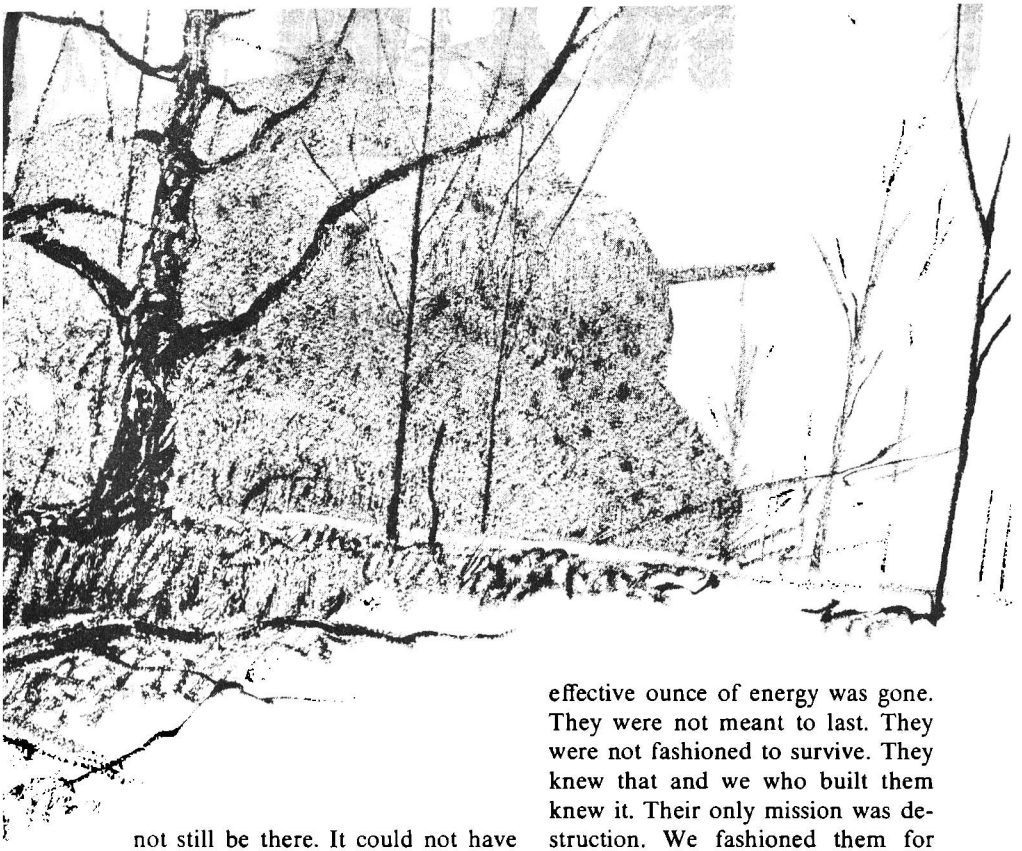
The noise was almost upon us, shrieking and deafening, and the very ground was howling. I leaped to one side and crouched to run and would have run, I suppose, except I did not know where to run, and in that instant I saw the great bulk of whatever it was up on the ridge above us, a huge dark mass that blotted out the stars. The trees were shaking wildly and crashing down to earth, overridden and smashed by the black mass that charged along the ridgetop, almost brushing the camp, and then going away, missing us, with the noise rapidly receding down the hollow. On the ridge above, the smashed-down trees were still groaning softly as they settled into rest.

I stood and listened as the noise moved away from us and in a little time it was entirely gone, but I still stood where I was, half hypnotized by what had happened, not knowing what had happened, wondering what had happened. Elmer, I saw, was standing, as hypnotized as I.

I sat down limply by the fire, and Elmer turned around and walked back to the fire. Cynthia slid off Bronco.

"What was it, Elmer," I said.

He shook his massive head. "It can't be," he mumbled, talking to himself rather than to me. "It would



not still be there. It could not have lasted . . ."

"A war machine?" I asked.

He lifted his head and stared across the fire at me. "It's crazy, Fletch," he said.

I picked up wood and fed the fire. I put on a lot of wood. I felt an urgent need of fire. The flames crawled up the wood, catching fast.

Cynthia came over to the fire and sat down beside me.

"The war machines," said Elmer, still speaking to himself, "were built to fight. Against men, against cities, against enemy war machines. They'd fight to the very death, until the last effective ounce of energy was gone. They were not meant to last. They were not fashioned to survive. They knew that and we who built them knew it. Their only mission was destruction. We fashioned them for death, we sent them out to death . . ."

A voice speaking from the past of ten thousand years before, speaking of the old ethics and ambitions, of ancient blood striving, of primordial hate.

"The ones who were in them had no wish to live. They were already dead. They had a right to die and they postponed their dying . . ."

"Elmer, please" said Cynthia. "The ones who were in them? Who was in them? I had never heard that anyone went in them. They had no crews. They were . . ."

"Miss," said Elmer, "they were not

all machine. Or at least ours were not all machine. There was a robot brain, but human brains as well. More than one human brain in the one I worked on. I never knew how many. Nor who they were, although we knew they were the still competent brains of competent men, perhaps the most competent of military men who were willing to continue living for a little longer to strike one final blow. Robot brain and human brain forming an alliance . . ."

"Unholy alliance," Cynthia said.

Elmer shot a quick glance at her, then looked back at the fire. "I suppose you could say so, Miss. You do not understand what happens in a war—a sort of sublime madness, an unholy hatred that is twisted into an unreasoning sense of righteousness. . . ."

"Let us quit all this," I said. "It may have been no war machine. It may have been something else entirely."

"What something else?" asked Cynthia.

"It's been ten thousand years," I said.

"I suppose so," Cynthia said. "There could be a lot of other things."

Elmer said nothing. He sat quietly.

Someone shouted on the ridge above us and we all came to our feet. A light was bobbing up there somewhere and we heard the sound of bodies forcing their way through the swath of fallen trees.

Someone shouted again. "Ho, the fire!" he said.

"Ho, yourself," said Elmer.

The light kept on bobbing.

"It's a lantern," Elmer said. "More than likely the men who were out hunting with the dogs."

We continued to watch the lantern. There was no more shouting at us. Finally the lantern ceased its bobbing and moved down the hill toward us.

There were three of them, tall scarecrow men, grinning, their teeth shining in the flicker of our fire, guns across their shoulders, one carrying something on his back. Dogs frisked about them.

They stopped at the edge of the campfire circle, stood in silence for a moment, looking us over, taking us in.

"Who be you?" one of them finally asked.

"Visitors," said Elmer. "Travelers, strangers."

"What be you? You are not human." He made it sound like "hooman."

"I am a robot," Elmer said. "I am a native of this place. I was forged on Earth."

"Big doings," said another one of them. "Night of big doings."

"You know what it was?" said Elmer.

"The Ravener," said the first who had spoken. "Old stories told of it. Great-grandpappy, his father told him of it."

"If it pass you by," said the third

one, "no need of fearing it. No man sees it twice in one lifetime. It comes again only after many years."

"And you don't know what it is?"

"It's the Ravener," as if that were all the explanation that was needed, as if no one should ask for more.

"We seen your fire," said the first one. "We dropped by to say hello."

"Come on in," said Elmer.

They came on in and squatted by the fire, their gunbutts rested on the ground, the barrels propped against their shoulders. The one who had been carrying something on his back threw his burden to the ground in front of him.

"A coon," said Elmer. "You had good hunting."

The dogs came in and flopped down on the ground panting. Their tails beat occasional polite tattoos.

The three sat in a row, grinning up at us. One of them said, "I am Luther and this is Zeke and the fellow at the end is Tom."

"I am pleased to know you all," Elmer said, speaking as politely as

IN TIMES TO COME

The cover story next month is "The Second Kind of Loneliness," by George R. R. Martin. It's a bit unusual for us to feature a short story on the cover, but Martin's concept of a manmade gravitational vortex that allows starships to "jump" from one point in the universe to another is so visually stunning that it demands a full color illustration. Kelly Freas has come up with one of his best paintings ever.

Martin's first appearance here was a few months back, with an article on computer chess programs. He has another short story coming up soon, and is working on still more stories. He's a talent to be watched. "The Second Kind of Loneliness" deals with the physical isolation imposed by men who work alone in deep space, and the mental isolation that can strike any of us, even in the heart of a bustling city.

December's issue will also feature Part Two of Clifford Simak's "Cemetery World," an adventure yarn by F. Paul Wilson; and a story of how telepathy might be used as an aid in brain surgery, by newcomer Joe Allred. Also—space permitting—a story by Howard Myers, and Miriam Allen deFord's first appearance in Analog.

The fact article, by Joseph F. Goodavage, delves into the latest developments on psionic devices, such as the Hieronymus machine. Nobody can provide a coherent theory to explain them, but there's mounting evidence that the strange things work!

he could. "My name is Elmer and the young lady is Cynthia and this gentleman is Fletcher."

They bobbed their heads at us. "And what kind of animal is that you have?" asked Tom.

"His name is Bronco," said Elmer. "He is an instrument."

"I am glad," said Bronco, "to meet up with you."

They stared at him. "You must not mind any of us," said Elmer. "We are all off-worlders."

"Well, heck," said Zeke, "it don't make no difference. We just saw your fire and decided to come in."

Luther reached into his hip pocket and pulled out a bottle. He flourished it in invitation.

Elmer shook his head. "I can't drink," he said.

I stepped over and reached for the bottle. It was time I did my part; up till now Elmer had done all the talking.

"It's right good stuff," said Zeke. "Old man Timothy, he was the one who made it. Great one with his squeezings."

I pulled the cork and put the bottle to my lips. It damn near strangled me. I kept from coughing. The booze bounced when it hit my stomach. My legs felt rubbery.

They watched me closely, the grins held tightly in.

"It's a man-size drink," I told them. I took another slug and handed back the bottle.

"The lady?" Zeke asked.

"It is not for her," I said.

They passed the bottle among themselves; I squatted down facing them. They passed the bottle back to me. I had another one. My head was getting a little fuzzy from the three quick drinks, but it was, I told myself, for the common good. There had to be one of us who talked their kind of language.

"Another one?" asked Tom.

"Not right away," I said. "Later on, perhaps. I don't want to drink all your liquor."

"I got another in reserve," said Luther, patting a pocket.

Zeke pulled a knife from his belt, reached out and pulled the coon toward him.

"Luther," he said, "you get some green saplings for roasting. We got fresh meat and we got some booze and a good hot fire. Let's make a night of it."

I glanced over my shoulder at Cynthia. Her face was pale and drawn, her eyes watching in horror as Zeke's knife slit neatly down the coon's spread-out belly.

"Easy there," I said.

She flashed a sick smile at me.

"Come morning," said Tom, "we'll go home. Easier to get through the down trees when it's light. Big hoedown coming off tomorrow night. Glad to have you with us. I take it you will come."

"Of course we will," said Cynthia.

I glanced toward Bronco. He was standing rigid, with all his sensors out.

TO BE CONTINUED

RICHARD F. DEBAUN

THE PARTIES OF THE FIRST PART

In a totally new situation you do the best you can with what you have on hand—or tentacle.

The thing that awoke me stood at the foot of my bed, shaking my right foot with one of its tentacles and holding a gun on me with another. At least it looked enough like a gun to make me slowly raise my hands in what I fervently prayed was a universal gesture of surrender.

"Borg," the thing said, fixing me with a cold stare from its lidless blue eye.

I calmly choked back the scream that was trying to tear out of my throat and forced my face into the biggest and warmest grin it was capable of.

"Friend," I greeted tentatively.

"Borg," the thing repeated, firmly pulling my foot out from under the blankets with a tentacle.

Let me tell you, neighbor, the sensation of that thing's tentacle on my bare ankle will remain forever in my scrapbook of favorite terrors. Kind of slimy with a slight electrical tingle. I needed no further encouragement.

"I'm with you, pal," I squeaked, quickly hopping out of bed.

Guided by the too-frequent prodding of tentacles, I soon found myself standing in my back yard shivering in my underwear, hands raised and grinning my fool head off. Next to me stood my late-night visitor, looking like a five-foot-two, eye of blue, fire hydrant with sections of garden hose stuck randomly about its body, one of which still held the gun on me. And sitting in the middle of my back yard was a luminous egg

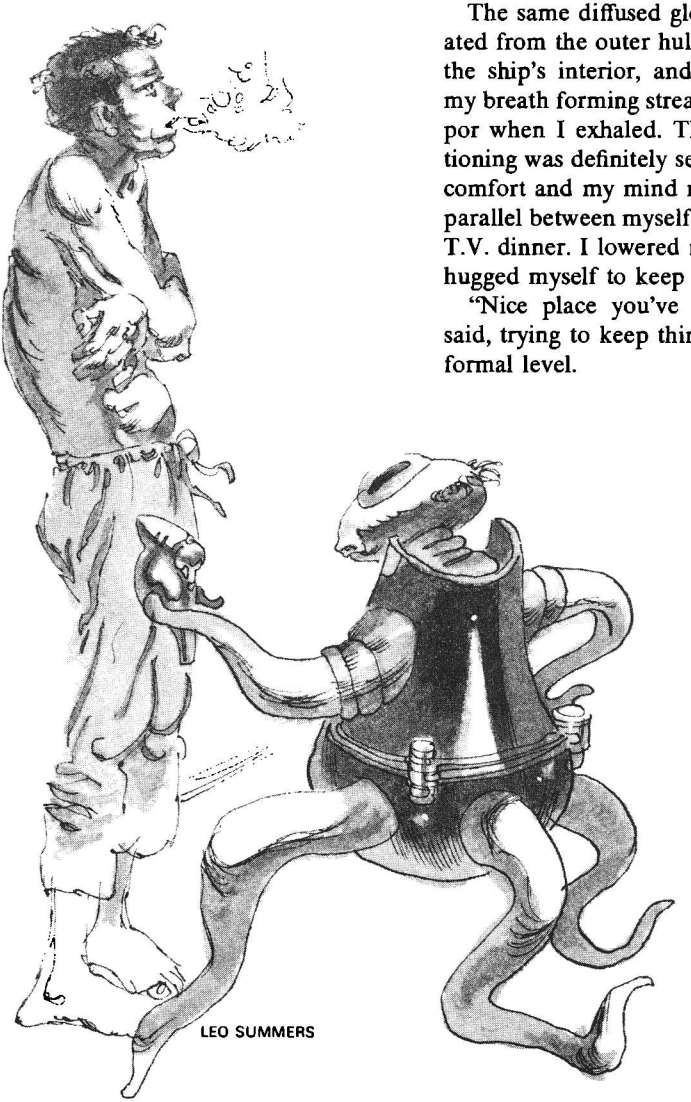
as big as a small house. I quickly put two and two together.

"That's your spaceship, right?"

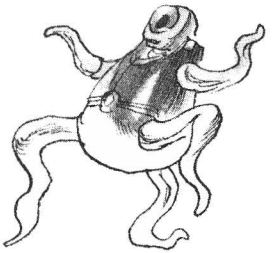
"Borg," the thing answered, and pushed me toward the opening which had appeared in the egg's side.

The same diffused glow that radiated from the outer hull illuminated the ship's interior, and I could see my breath forming streams of icy vapor when I exhaled. The air-conditioning was definitely set too low for comfort and my mind made a crazy parallel between myself and a frozen T.V. dinner. I lowered my arms and hugged myself to keep warm.

"Nice place you've got here," I said, trying to keep things on an informal level.



LEO SUMMERS



We were in a small, spherical chamber, completely bare of any furnishings or decoration. The wall-floor-ceiling was made out of a soft, spongy substance that almost oozed between my toes. A hole opened up in the ceiling and another fire hydrant creature dropped down in front of me with a light bounce. This one wasn't as tall as my armed escort, but his glistening yellow skin made up for it in sliminess. I hoped *he* didn't go in for touching strangers.

"Habla usted Español?" it asked.

"Leapin' lizards!" I chirped. "The Martians are Spanish!"

The newcomer fiddled with a small plastic box he held in one of his tentacles and spoke again: "Do you speak English?"

"Borg," I nodded affirmatively.

"These damn things never work when you need them," muttered my host, disgustedly slapping the plastic box against the wall.

"I speak English! I speak English!" I assured it.

"Oh!" it said, startled. "Well, uh, in that case, uh, allow me to introduce myself. I am called Fong. The man next to you is called Rizit. We are—"

"Let me guess," I interrupted. "You are aliens from another planet and this is your spaceship. You, Fong, are a scientist. Rizit is your assistant. You have come to study life on my planet in order to determine whether or not it is suitable for colonization and/or conquest by your race. I am the random sample of native intelligent life for that study. That small box you are holding is a two-way translating device. You were able to program it by studying my planet's radio signals before you landed. We are now probably in orbit far above my planet so no one would stumble onto your spacecraft in my back yard. Right?"

"Amazing," whistled Fong. "We had no idea you people were telepaths!"

"We're not really telepaths," I chattered through my now blue lips. "We're just highly intuitive."

"Well, even so," said Fong resolutely, "we are determined to obtain certain information vital to our, uh, project concerning your planet. We will not hesitate to use whatever means necessary to obtain that information, so I strongly advise you, for the sake of your own personal well-being, to abandon any notion of resistance."

"Resistance!" I laughed weakly, trying for a front of bravado to conceal the growing hysteria underneath. "My dear Fong! Why should I want to resist? Interrogation is a

two-way street, you know. I shall, no doubt, learn as much about you from your questions as you will learn about me from my answers. Probably more."

"You will?" said Fong, disturbed.

"Highly intuitive," I reminded him.

"This is not the behavioral attitude predicted on the basis of the content of your planet's radio broadcasts."

"Radio broadcasts!" I tried to sound condescending. "Fong, our radio broadcasts are intended as diversions for bored infants and the mentally insufficient. You haven't been taking them seriously, have you? I don't believe it! What kind of a scientist *are* you?"

"Bored infants?" questioned Fong.

"And the mentally insufficient," I affirmed.

"But I found them quite entertai—" Fong stopped himself in time.

"See here, Fong. If your preliminary studies are based entirely on the contents of my planet's radio broadcasts, there is absolutely no point in our continuing this discussion any further. You would be basing your interpretations and conclusions on incorrect data, which is worse than basing them on no data at all. Besides, it wouldn't be fair for me to be the only one on the receiving end, would it?"

"What do you mean you would be the only one on the receiving end?" demanded Fong. "By your own terms you could determine nothing of consequence without previous data."

"Are you putting me on, Fong?"

Fong slapped the translating device again.

"You can't be as naïve as you pretend," I continued. "Do you really think it's possible to go flying around a strange planet, poking your nose in things, monitoring radio signals or whatever and avoid detection? This planet *is* inhabited by an intelligent form of life, you know."

"This is the first planet with intelligent life that we have ever come across," explained Fong in a tone of voice that was definitely defensive. "We've never tried conquering anyone before."

"Well, you really botched the job, didn't you?"

"Do you mean to say your people really know about us?"

"We've known since the very first," I lied. "In fact, with the information I've picked up as a result of this face-to-face meeting, there is very little we don't know about you."

"That error can be corrected," Fong suggested menacingly. Subtlety wasn't one of Fong's strong points.

I had the feeling that if I didn't get out of there in a hurry, I'd never get out at all. Frost had started to form on my arms and legs. I decided to bet the farm.

"Since we're both in agreement as to the pointlessness of continuing this meeting any further I suggest we adjourn. You may return me to my back yard."

"And what makes you think we would want to release you?" said Fong, sounding just like Richard Loo as the Japanese interrogator in an old World War II movie.

"For the sake of your own safety, of course."

"*Our* safety?"

"Listen to me, Fong." The rivulets of sweat pouring off my back were freezing halfway down. "I want you to think. Can you really imagine, knowing all we know about you, that you were allowed to land in just anybody's back yard? That we let you kidnap someone by pure chance? That I would permit you to take off without my being absolutely certain of the outcome? Without my being *armed?*"

"Armed!" cried Fong, quickly stepping back.

"I am a walking bomb," I bluffed. "The moment I will it my body detonates . . . something along the order of a thirty-kiloton nuclear explosion, I think."

Small beads of green liquid appeared on the surface of Fong's skin. It was comforting to know that I wasn't the only one in a sweat.

After a few more moments spent ironing out a minor difficulty or two, Fong set the ship down in my back yard again, let me out, and flew off into space. I'm not embarrassed at all to admit that the first thing I did was get down on my hands and knees and kiss the ground. Then I ran into the house, turned the furnace up full blast and had a drink. Correction. I had several drinks.

I deserved it. Everything didn't go quite as smoothly as I've described. Especially right at the end. Fong almost decided not to let me go. He said that he would rather be blown apart by my explosion than face his superiors after he gave his report. His superiors, it seems, were the ones who were really hot on gathering data from our radio broadcasts.

I could appreciate Fong's situation and was finally able to come up with a solution that satisfied him. I offered him, in my capacity as Earth's self-appointed representative, a treaty of peace in perpetuity with our planet. The conditions were simple: we'd leave them alone if they'd leave us alone. Fong really got warm to the idea when I pointed out that back home he would be credited with saving his people the effort and expense of an interplanetary war in which, I also pointed out, they might not be the victors. Everything worked out fine for Fong.

There is, however, one slight catch for our side.

It seems that on Fong's planet they have a kind of special custom when it comes to making deals or signing treaties. All the participating chiefs-of-state, all the signatories, all parties to the contract, must go through a sacred ceremony together. The chiefs-of-state from Fong's home planet should be arriving in my back yard for the ceremony any day now. All six hundred million of them. ■

POLLUTION PROBE

If you happen to be driving through a city or town and see a couple of people out in the middle of a school football field or a park looking as though they are getting ready to fly a rocket, don't immediately assume that they are model rocket hobbyists.

They could be meteorologists preparing to launch a LARS(R)*—Low Altitude Rocket Sonde—for air pollution forecasting.

If you stop, get out of your car, and go over to have a closer look, it will still appear that the meteorologists have one of those little solid-fuel model rockets that have made some thirty million flights in the United States over the past fifteen years. You'd be one hundred percent right if you thought it looked just like the model rockets you can buy down at the local hobby store.

Professional rocket engineers and meteorologists have put the safe, reliable, inexpensive model rocket to work measuring air pollution over our cities and towns. It is important work for a little gadget, because if you can't measure something, you may have trouble doing something effective about it.

Nearly a hundred years ago, it was Lord Kelvin who said, "When you can measure what you are speaking about and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science, whatever the matter may be."

Air pollution was a reality even in Lord Kelvin's time. It was an early consequence of the Industrial Revolution, and you could probably trace it back to even more ancient times. Air pollution probably occurred—as

* LARS is a registered trademark of Colspan Environmental Systems, Inc., Boulder, Colorado.

Science for the people!
The technology of model rocketry
is being used to make accurate forecasts
of pollution problems.

G. HARRY STINE

it does now—anywhere with a high population density, such as a city with a population of 25,000 or more, and with a high energy density created by combustion processes. For the purposes of this discussion, however, let's use Stine's Definition of Pollution: All living organisms produce waste (to them) products, but they pollute their immediate environment only when they produce these waste products in greater quantity and density than the immediate environment can absorb or dispose of.

Thus, air pollution as we know it probably didn't exist before the Industrial Revolution, and people put up with it because it was one of those consequences they were willing to live with. They were also probably ignorant of the ecological and physiological effects. I grew up in a house on a hill overlooking Colorado Springs, Colorado. Everyone believes that "out thar" the air is sweet and pure and clear. But I can well remember cold winter mornings when a pall of gray-brown smoke hung over the city for a couple of hours after sunrise. This pall was created by thousands of household furnaces burning bituminous coal. Nobody paid much attention to the smoke pall because it broke up and drifted down the valley toward Pueblo about 9:00 a.m., and then the mountains stood out bright and clear as always. The Chamber of Commerce kept telling us that it was a privilege to live in Colorado, but maybe they didn't get up until after 9:00 a.m. on winter mornings.

At any rate, even if the townspeople had complained about air pollution then, coal was the only thing available to heat homes; natural gas had not yet become available. And they could not have measured the air pollution. It was a go-no-go proposition; it was either there or it wasn't; like the oil pressure idiot light on an automobile. If you can't measure it, you can't determine time-rate and you can't establish any baseline data for comparison.

In order to do something about a physical condition such as air pollution, you must be able to measure it in accordance with Lord Kelvin's criteria. Once you can measure it, you can begin to establish baselines and perhaps link cause and effect. Then you can begin to forecast it and do something about it.

The act of measuring implies the possession of the correct, calibrated measuring instrument. Both a calendar and a stopwatch are accurate time-measuring tools, but they have widely different ranges, tolerances, and limits of accuracy. A calendar is useless at a track meet.

The pivotal science behind air pollution can be considered as macro-fluid-dynamics or local meteorology. It was patently obvious to technical observers that urban air pollution seemed to be dependent upon the weather. But what weather conditions caused air pollution? The measurement tools of meteorology—the

barometer, thermometer, hygrometer, and anemometer—could produce some Kelvinian numbers of current ambient surface conditions. But the readings were made at a single point on the ground; the air pollution existed over the entire city and extended several thousand feet upward as well. A synoptic weather map was useful in forecasting weather conditions, and this could give meteorologists and long-suffering townspeople some idea of when the winds might blow the smog away to somewhere else.

Other measurements were required to get a numerical handle on air pollution. Experts discovered that they needed (a) vertical temperature profiles, taken at least daily and preferably several times each day from at least one location and preferably, in a large industrial city, from several locations; and (b) air movement data to accompany the temperature profile data.

Instruments existed to measure these parameters, and vehicles were available to put the instruments where you wanted the measurements to be made. You could use a rawinsonde weather balloon, an off-the-shelf item, which would provide temperature readings at 1,000-foot intervals or so and wind velocity data from the surface to 60,000 feet or so. This would set you back about $100 per flight, mainly because it was rare to get the instrument package back. It was like using an expensive stopwatch as a substitute for a calendar. You could de-rate the balloon system, but it still had more performance and therefore greater cost than needed. Or you could go first-class, put the instruments in an airplane, and hire a pilot to fly around in an ascending spiral over the city—but this costs many dollars per hour and complicates the data reduction problem because the airplane doesn't go straight up over its takeoff point.

Be that as it may, early air pollution measurements were made using this existing instrumentation and these vehicles. In solving an engineering problem, one must always start somewhere with existing art. And one must learn what measurements are really necessary and then what to look for in those necessary measurements.

It was no surprise to learn that you didn't need to make measurements all the way up to the stratosphere; you only needed to know what was going on up to, say, 4,000 feet or so at the very most. Nearly all urban air pollution takes place in a thin layer next to the ground and ranges in thickness from about 1,000 to 4,000 feet. It is also quite localized.

Numbers were obtained. And the numbers were combined, synthesized, analyzed, massaged, plotted, graphed, and studied. It was learned that you did not need wall-to-wall data to do effective air pollution forecasting. If you had the regular U.S. Weather Service synoptic data, you only needed to obtain (a) the

vertical temperature profile and (b) the average speed of horizontal air movement through the air pollution layer.

In the meantime, there were those of us who were working with small rockets for fun and profit. For many years, I have been interested personally in the nonmilitary applications of small rocket vehicles; one of the most urgent applications, then and now, was in the educational-recreational hobby area. Back in 1957, an alarming number of young people were being seriously injured or killed because it is a natural American trait for the amateur scientist-technologist to attempt to emulate the pros, usually without the expertise and equipment of the professionals. This provided the stimulus for us to launch the hobby of model rocketry (or "space modeling" as it is growing to be called). A model rocket is a space-age version of the model airplane; it is a small (less than 24 inches long), lightweight (less than 16 ounces), nonmetallic (paper, plastic, and balsawood), fin-stabilized aeromodel propelled by an expendable, factory-loaded solid-propellant rocket motor. It uses a parachute or other high-drag recovery device to return it slowly to the ground. It can be used over and over again by simply repacking the recovery device in the model and inserting a fresh model rocket motor.

At the present time, millions of model rockets have been flown all over the world by ordinary people. There has been nothing more serious in the way of accidents than a couple of minor burns caused by failure to follow instructions. This makes model rocketry the safest of all hobbies except, perhaps, stamp collecting. Because the models, motors, and other equipment were going to be used by young people and/or those who were not rocket experts, a lot of thoughtful development went into them. Their reliability is very high—the proverbial nine-nines. They are so simple that a grade-school child can assemble and fly one successfully. They are cheap; a ten-dollar bill will put you in the model rocket hobby with flying model kit, expendable model rocket motors, launch pad, electric ignition system, and firing battery.

Most important, these model rockets could carry small, light payloads.

One of the favorite payloads of the model rocket hobbyist is a single, Grade A, *fresh* (not hard-boiled) hen's egg; it is a supreme test of skill to be able to launch, fly, and recover a fresh egg without breaking it . . . and thousands of model rocketeers do it regularly. But a hen's egg doesn't do anything except to teach you how to handle and cushion a very fragile payload, sort of a simulated miniature astronaut. Other model rocket payloads were developed, and most of these are inexpensive, off-the-shelf items today. For a ridiculously low price ($20), you can buy a 3-ounce movie camera

that will take cine pictures in flight. Or there's the cheaper ($5) still camera that takes one picture per flight. In addition, you can buy a cheap ($14.95), lightweight (0.6 ounce) radio transmitter kit that operates with low power on the citizen's band and is capable of sending back data on air temperature.

With existing, factory-made, off-the-shelf rocket motors selling for less than $5 each, it is possible to loft these payloads to several thousand feet and get them back unharmed.

If cheap, reliable, safe model rockets could do this sort of thing on a fun-and-games basis for hobbyists, why couldn't they also do it seriously for scientific purposes?

Back in the late 1950's, several of us knew this was a possible market for small rockets. We designed and developed a small rocketsonde capable of carrying modified radiosonde equipment up to 100,000 feet. It was not the usual de-rated military rocket system, but an "up-rated model rocket" using the same technology with an increase in size and power. We hoped it would replace the slow and expensive weather balloon. This was all reported, incidentally, in George Willard's article, "The Complex Problem of the Simple Weather Rocket," in the June 1961 issue of Analog.

It didn't occur to us at that time to apply the model rocket to the measurement of air pollution. That was before air pollution was recognized as a serious environmental problem

by anybody outside of Los Angeles.

But times changed. And air pollution increased. And people got really concerned about it.

And air pollution meteorologists began looking for cheap methods to obtain their needed temperature and wind speed data over cities.

And there was the model rocket system, ready and waiting, with over a decade of development already put into it.

The hobbyist's little model rocket was converted into a genuine piece of Kelvinian instrumentation by Robert Strieby, Dr. Bill Womack, and their colleagues at Colspan Environmental Systems, Inc., of Boulder, Colorado.

Their system is called LARS—Low Altitude Rocket Sonde. It uses a plastic rocket vehicle with a miniaturized radio transmitter in its nose, a bead thermistor to measure air temperature, and a modularized factory-loaded solid-propellant rocket motor made by Flight Systems, Inc.

The launch pad is also the carrying case for the rocket vehicles and other equipment. It fits easily into the trunk of a car, and one man can set it up in minutes. The launcher is a simple aluminum rail, and launching lugs on the vehicle slide up and down the rail.

Launch control and the telemetry ground station is built into a suitcase 19″ x 14″ x 7″. The suitcase contains the entire electrical launch system, a dipole antenna, FM radio receiver, and a strip-chart recorder. If you wish, you can plug in a portable tape recorder as well.

The whole LARS system is a one-man portable operations station. And it is not labeled portable just because there are handles on the equipment boxes. The rocket launcher weighs 25 pounds; the ground station suitcase weighs 20 pounds.

LARS flights should be made at least once each day about one hour after sunrise. Making a LARS sounding is somewhat anticlimactic if you are expecting something as complex, heart-stopping, or world-shaking as a Saturn-V launch. It's about as exciting and difficult as pouring water out of a boot with instructions written on the heel. LARS can be launched from any clear area about 20 feet in diameter with no overhead obstructions. But if you want to get the LARS vehicle back again, you will have to have some additional ground area for the vehicle to land in. You will also need to be able to measure some ground distances, as we shall see. (Naturally, if there are any trees around, the LARS parachutes have a high probability of ending up snagged in the branches, as any model rocketeer will quickly tell you.)

Out of the car trunk comes the launch pad, a long plywood box that opens into two hinged parts. It opens again to reveal two storage volumes and an extruded aluminum launch

rail about 3 feet long. By tightening a few thumb screws, the launcher is all set up and ready to go.

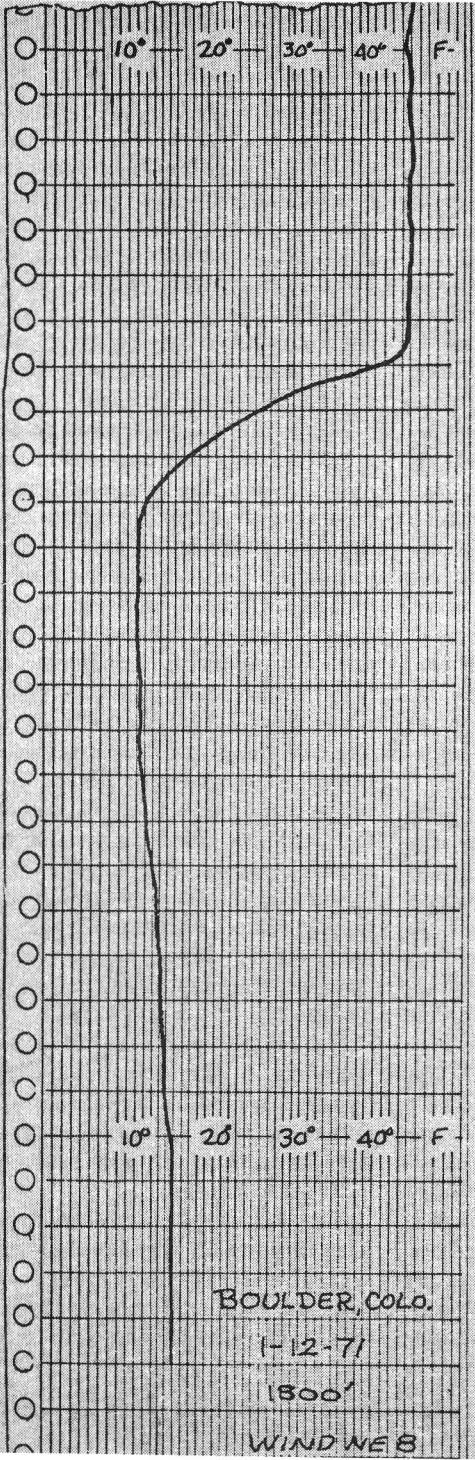
The LARS vehicle is made from plastic and is a simple fin-stabilized, free-ballistic airframe 1.25 inches in diameter and about 24 inches long with four clipped-delta fins epoxied on the rear end. The propulsion assembly contains the expendable solid-propellant rocket motor and two parachutes—one for the LARS vehicle and the other for the propulsion assembly. The unit slides into the aft end of the LARS body and is held in place by a pin inserted through the vehicle. This can be preassembled ahead of time. All together with loaded rocket motor and transmitter, LARS weighs a maximum of 14 ounces.

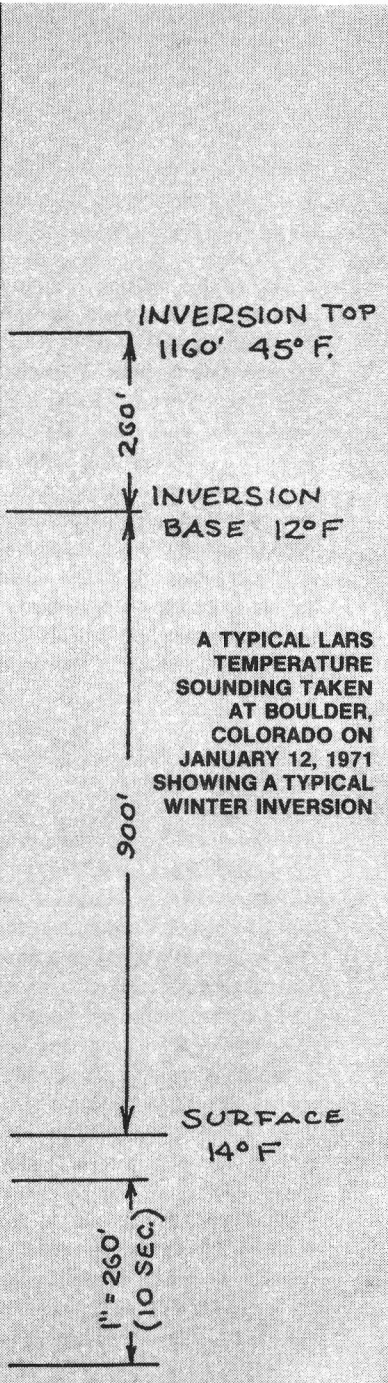
That's why there is no problem with air traffic clearances when flying LARS. Back in 1961, the model rocketeers of the National Association of Rocketry convinced the Federal Aviation Agency that there was no real hazard involved with nonmetallic rocket vehicles weighing less than a pound and carrying less than 4 ounces of rocket propellant. Their efforts appear to be justified because there haven't even been any near misses between aircraft and small rockets. After all, the Department of Defense spends millions of dollars in order to have rocket-powered guided missiles designed to deliberately hit an airplane. It's an incredibly difficult task. The chances of an unguided rocket hitting an airplane are pretty slim—as the U.S. Army learned twenty years ago with a little unguided antiaircraft rocket called Loki. Thanks, therefore, to C.A.R. Part 101.1(c), you can fly a LARS anytime without having to fill out two pages of F.A.A. clearance forms in advance for each launch.

The LARS radio telemetry transmitter is completely enclosed in the nose section of the vehicle with only the thermistor bead sticking out into the airstream from the nose tip. The transmitter is completely transistorized, of course, and uses a rechargeable 9-volt battery. The battery will permit the transmitter to blare forth with 35 milliwatts of r-f power on 403 mHz. for 25 minutes. The first thing you must do is calibrate the thermistor and system. The transmitter is turned on by pulling the "umbilical plug" on the side of the nose section. The signal as received and recorded at the suitcase ground station is calibrated against an ordinary thermometer which measures the ambient ground temperature.

The electric igniter is stuffed up the nozzle of the rocket motor, the vehicle is placed on the launch rail, and the electric ignition system is hooked up. You are now ready to launch a rocketsonde.

If there is some wind blowing, you may wish to tilt the launcher rail slightly. LARS is a fin-stabilized vehicle and will therefore weathercock slightly into the surface wind as it





A TYPICAL LARS TEMPERATURE SOUNDING TAKEN AT BOULDER, COLORADO ON JANUARY 12, 1971 SHOWING A TYPICAL WINTER INVERSION

comes off the launch rail after ignition. By tilting the launch rail, you can put the vehicle into that part of the sky you desire. And if you're really good at it, you can put in the right tilt to get the parachutes to land close by.

Big countdown. Push the firing button. Firing current comes from the 12-volt lantern battery that's also operating the ground station. Or you can use the auto's battery.

And LARS is on its way up.

Three different rocket motors are available for LARS. They are all the same size. But they produce different total impulses and therefore different peak altitudes. All three produce about 35 pounds of thrust. The MARK II unit has a thrust duration of about 0.5 seconds and will loft LARS to 1,800 feet. The MARK III has a longer duration and gives a peak of 3,000 feet. The MARK IV will boost LARS to 4,000 feet.

As you can imagine, the 14-ounce LARS seats with that sort of thrust behind it.

The rocket motor contains an integral pyrotechnic time delay to permit LARS to coast up to peak altitude. For the MARK II 1,800-foot motor, this is 8 seconds of delay. Then a gas generator charge in the motor casing is activated, ejecting the propulsion unit from the tail of the vehicle. This is all quite straightforward to any model rocketeer because it works just like a rear-ejection model rocket. The ejecting propulsion assembly also extracts two parachutes, one for the vehicle itself and the other for the propulsion unit.

Although the LARS telemetry transmitter has been operating on the ascent, the system response times are far too long to permit any sort of accurate temperature data during the 8 seconds or so it takes to get to peak altitude. But there is plenty of time available as the vehicle drifts down under its little red parachute. The nose thermistor busily converts temperature to an electrical voltage which modulates the transmitter which squirts the signal back to the suitcase ground system on the 403 mHz. carrier. Back on the ground, the receiver decodes this signal and drives the recording pen of the strip chart recorder. It takes several minutes for the LARS parachute to lower the vehicle back to the ground.

Now you've got your vertical temperature profile.

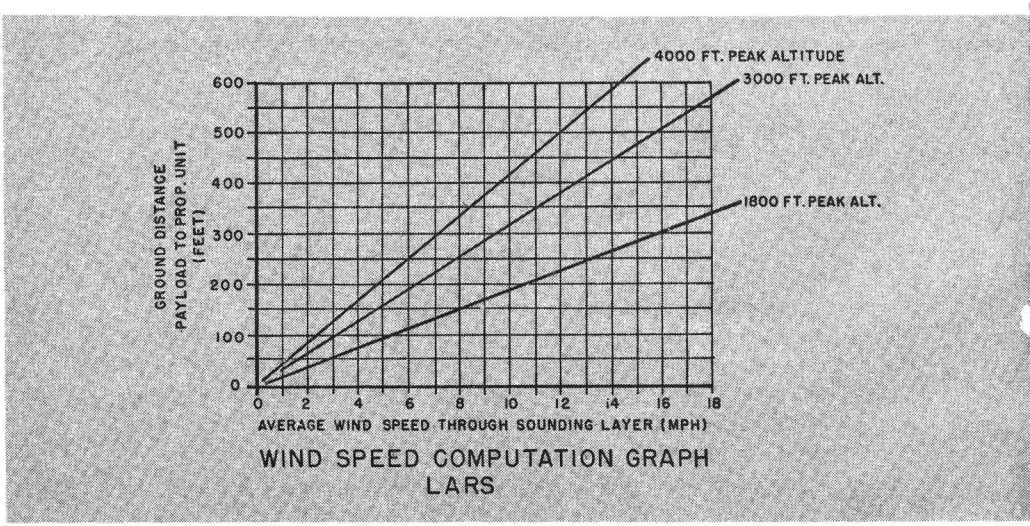
Obtaining the average horizontal wind velocity through the sounding layer is even simpler and is the result of some brilliant thinking.

The LARS vehicle and its propulsion unit are recovered on separate parachutes. Both objects have different weights and different parachute sizes. Therefore, they have different but known descent rates. The average wind through the sounding layer will cause the two different parachute-load systems to have different horizontal drifts. The higher the average wind, the greater the differ-

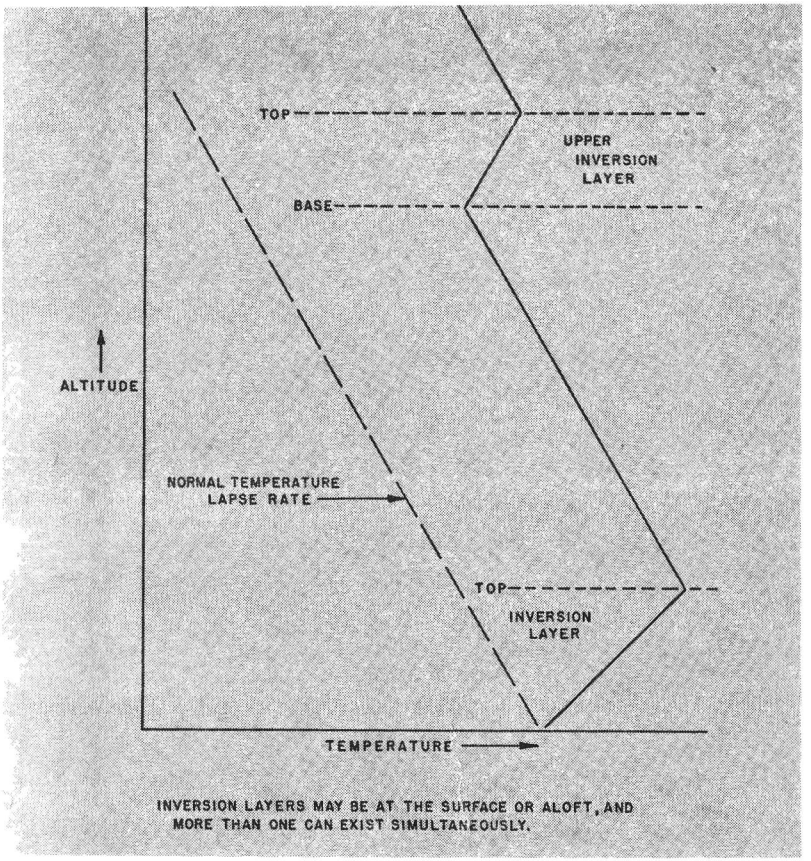
ential drift. All you have to do is measure the ground distance between the landing points of the LARS vehicle and the propulsion unit. After you bring the two items back to the launch site (and insert the umbilical plug to turn off the telemetry transmitter), the average wind speed through the sounding layer is determined directly from a chart. For example, if you shot to 1,800 feet and had a ground distance of 250 feet between the two units, the graph would tell you that you had an average wind velocity of 13 mph.

Armed with these two pieces of data, you can now compute air pollution dispersal data and forecast the air pollution index for the remainder of the day.

If there is a poor air pollution situation, LARS will probably find and measure a temperature inversion. Normally, the air temperature decreases approximately 3° F. per thousand feet of altitude increase. As you go up, it usually gets colder. This is known as the "normal adiabatic lapse rate." But, with a temperature inversion, as the altitude increases, the air temperature also increases. This is a situation that can easily exist in a large urban area where considerable energy is being dumped into the atmosphere. A "lid" of warmer air overlies the area. Therefore, the air near the ground cannot rise by convection and is trapped on or near the surface. LARS would see a temperature inversion by virtue of its vertical temperature profile. If you've put in a rocket motor of great enough total impulse, it may have gone through the top of the inversion



WIND SPEED COMPUTATION GRAPH
LARS

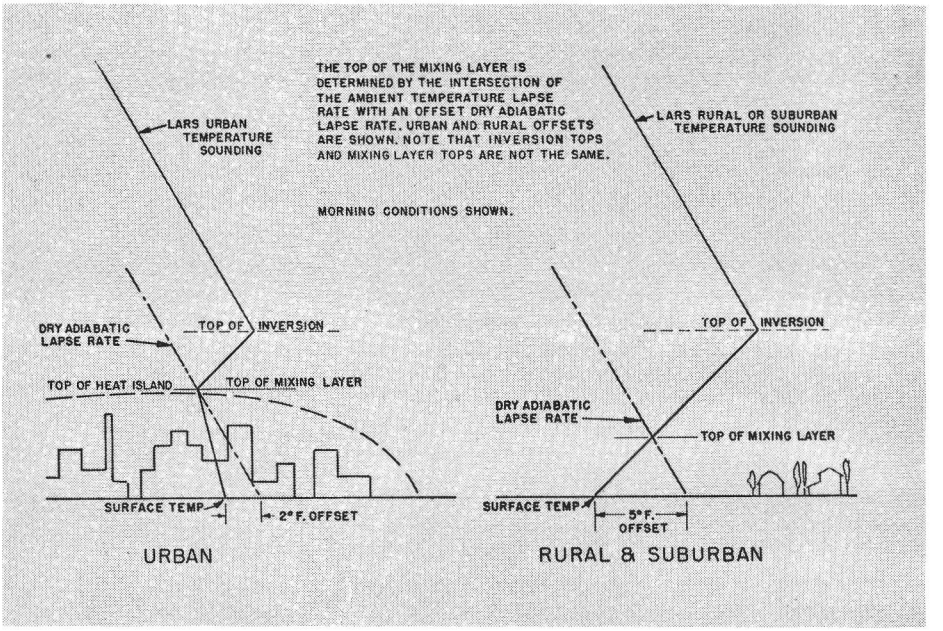


into the region of normal lapse rate above.

In the absence of any horizontal wind flow, the only way that air pollution can be dispersed is by mixing throughout the trapped volume of air in the inversion. Once all of the trapped volume is mixed, there is nowhere else for the pollution to go, and it just sits there and builds up.

The maximum vertical dimension available for the mixing of polluted air in any one day is known as the "maximum mixing depth." This is not necessarily the top of the inversion layer. Using the LARS vertical temperature profile data and dry adiabatic lapse rate charts, it is a simple matter to determine the mixing depth by graphical means.

There is enough baseline data available now in the air pollution discipline to permit forecasting of afternoon conditions from the results of an early morning sounding. If your friendly local weather bureau tells you that they don't expect any frontal activity, thunderstorms, or other rapid weather changes for the remainder of the day, you know that you've got the possibility of an air pollution problem. The LARS data



will tell you how bad the pollution situation will be. It is just a matter of comparing the early morning data against baseline factors to produce highly probable p.m. conditions.

We've been working with numbers here—or at least, our hypothetical LARS meteorologists have been. We're getting more Kelvinian all the time. Now comes the *pièce de résistance,* an empirical factor known as the Air Pollution Dispersal Index. This is the product of the mixing depth in feet and the average wind speed through the mixing layer in miles per hour—multiplied in turn by a Finagle Constant of 1.3 and divided by 1,000:

$$\text{APD INDEX} = \frac{\text{Mixing Depth} \times \text{Avg. Wind Speed} \times 1.3}{1{,}000}$$

Aha! Now we have a number! Now we can compare the APD Index against how bad the air pollution is and come up with something that will stop Lord Kelvin from spinning in his mausoleum:

APD INDEX NUMBER	AIR POLLUTION DISPERSAL CONDITION
0-19	Poor
20-39	Fair
40-59	Good
60 and up	Excellent

If the APD Index is less than 20 and the condition persists for more than 36 hours, you've got troubles. Better start shutting down furnaces, restricting auto travel, and otherwise eliminating sources of air pollution.

If the air pollution begins to get bad, it is always possible to go out and keep tabs on it with additional LARS flights. You'll then get some trend data that could be even more valuable than the spot data.

If you make regular daily LARS soundings, you will begin to build a library of baseline data for various months and seasons of the year. After a time, you will be able to compare the current APD Index data against a baseline. You will be able to tell if air pollution campaigns are effectual. You will be able to forecast with greater accuracy what the air pollution situation is likely to be. *Voila!* You are beginning to talk as a scientist!

The cost of doing this with the LARS is sort of ridiculous—ridiculously low, that is—when compared to the cost in terms of human lives, human suffering from respiratory ailments, and possible ecological damage. Colspan's price for a complete LARS system—three vehicles, propulsion units, launcher, and ground station—is about $3,000. The cost per flight is only the cost for the expendable Flight Systems, Inc., solid-propellant rocket engines: it's about $5.

LARS is being used by several government and private agencies interested in air pollution—the states of California, New York, and Colorado; the TVA; Colorado State University, Montana State University, and the Chattanooga Institute of Technology; Martin-Marietta Corporation; and NASA-Lewis Research Center in Cleveland. The city of Pueblo, Colorado has the big steel mills of Colorado Fuel and Iron Corp. to complicate their air pollution situation, and they are running a LARS program there for $3,000 per year.

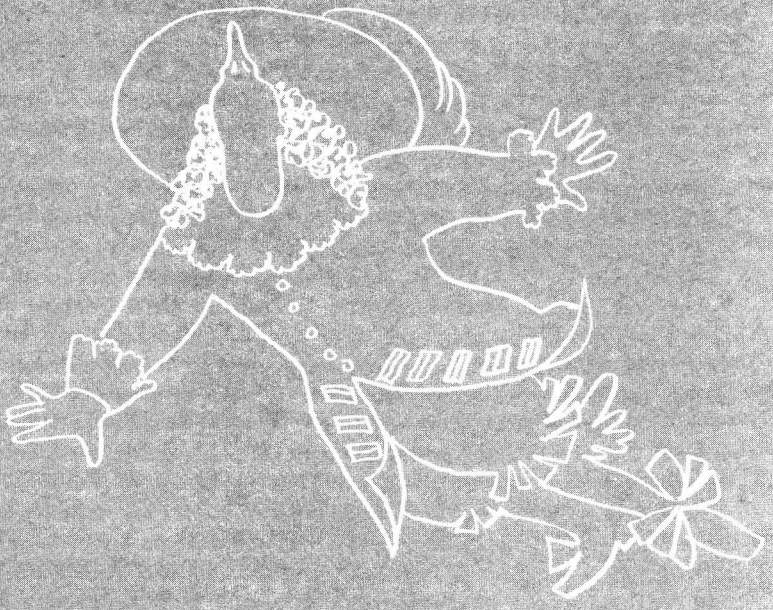
Obviously, we are well past the first phase of solving the air pollution problem: recognizing that there is a problem. We are well into the second phase: doing something about it, because we are starting to measure, to get numbers, to advance air pollution control to a science instead of an empirical rule-of-thumb art. And we are doing it with technology being used to solve the problems caused by technology. We are doing it by clever synthesis, by bringing together two previously unrelated fields of interest.

Whoever would have believed that air pollution would be measured and controlled because of those silly, unimportant little toy rockets you could buy down at the hobby store?

I did, for one. And I am simply delighted. Now, let's see: I wonder what other problems could be solved by using the techniques we've developed for small, safe, light, reliable, inexpensive rocket propulsion systems . . .? ■

CYRANO de BERGERAC:

The First Aerospace Engineer



Illustrated by Linda Morey Papanicolaou

Cyrano was a true Renaissance man—
scholar, swordsman, poet,
science fiction writer, and engineer(?)!

LOREN E. MOREY

"My nose!
Know that I glory in this nose of mine,
For a great nose indicates a great man
Genial, courteous, intellectual,
Virile, courageous . . ."

So he was, the Cyrano de Bergerac of the drama by Edmond Rostand, first played in Paris on December 28, 1897. It is a story worth telling whenever and wherever men consider themselves less than worthy of what they want most. This Cyrano—there was another one—loved the fair Roxane, but because he was ashamed of his ugly nose, he dared not tell her so. Instead, according to Rostand, he wrote letters and poetry for the handsome but inarticulate Christian because Roxane had confided that she loved the younger man.

In one scene of Rostand's play, Cyrano delays the villainous de Guiche by reciting seven ways to reach the Moon, while Roxane and Christian escape. Despite his disbelief, de Guiche is fascinated by Cyrano's bit of science fiction. Before he can break the spell, Roxane and Christian are married. In these lines Rostand, dramatizing the life of the Seventeenth Century author and philosopher, admitted that there was a second Cyrano—author of the first story about a rocket-powered flight to the Moon.

Savinien Cyrano, the son of a poor lawyer, was born in Paris about 1620. Three years later the family moved to their small estate of Bergerac, the name that Cyrano adopted and used in one form or another throughout his life. At the age of thirteen Cyrano was sent to school in Paris. In the five years he spent at the College de Beauvais, Cyrano acquired a well-rounded education in the new humanism. After two years in a company of guards, he returned to a life of study at the College de Lisieux where he attended the classes of Pierre Gassendi, one of the philosophers and mathematicians whose informal meetings led to the formation of the French Academy of Science. Thus, Cyrano was privileged to witness

the birth of science as an investigative discipline.

The scholars do not agree on whether Cyrano was the model of chivalry, as Rostand made him, or a vain, ill-tempered gambler and tavern brawler. Perhaps he was both. He refused the patronage of a rich noble because he wanted to remain a free man, but only because he had robbed his father as the old man lay dying and was, for the moment, less impoverished than usual. He fought many duels as a second but never for his own quarrels. It was probably not his large nose but his syphilis that kept him from the opposite sex. Cyrano seems to have mixed a thorough study of the current scientific ideas with a dissolute way of life.

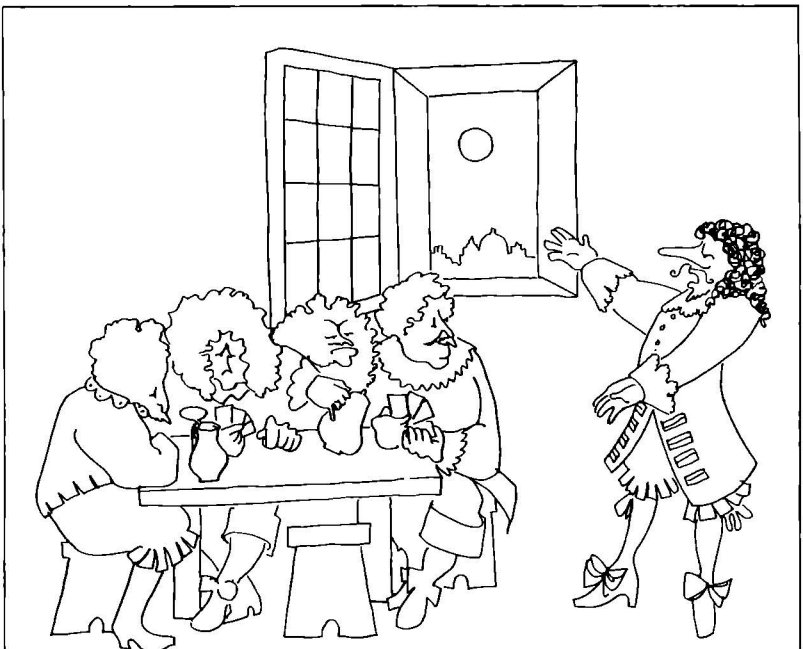
Cyrano's story of a trip to the Moon, written in about 1650, was not in the usual vein for medieval space travel. Lucian of Samos, in the Second Century A.D., had transported his hero to the Moon by a waterspout or, in a second book, on a pair of wings. Johannes Kepler used better judgment in the early Seventeenth Century; witchcraft was the plausible means for getting from Earth to our satellite. Bishop Godwin, writing in 1638, used trained swans that just happened to be of a species that migrated to the Moon. Cyrano realized that powered flight was the proper means for celestial travel.

Cyrano was up-to-date in knowledge of the science of his day. He knew that a "spyglass" could be used to enlarge the features of the Moon, a feat that Galileo had announced in 1610. He had read the works of Copernicus and Kepler. He could also invent what might have been the first wire recorder. He was familiar with magnets, spring-powered clocks and fireworks. He may have traveled to England, Italy and Poland, where he saw experiments with a flying machine.

Describing his means of travel to the Moon was only secondary to his real purpose, that of stating his belief in the new humanism; but Cyrano did hit upon the use of rockets, and thus was the first writer to make use of the only practical means for space travel known to the Twentieth Century. Cyrano even invented propulsion staging, although his second stage was pure fantasy. His tale of how Elijah rose to the Moon by throwing a loadstone might be the first description of an antigravity machine—well before Newton described the natural force. On a later flight to the Sun, Cyrano used a ramjet. In all, Cyrano de Bergerac was the first of the Moon travelers to use mechanical power for flight and for that deserves his niche in the aerospace hall of fame.

Cyrano was more of an engineer in his original book than Rostand allowed him to be in the play. Since today's writers of popular aerospace histories seem to rely on the playwright's version, it seems only fair to credit him with what knowledge of space flight he had and to retell it as it was.

Cyrano and several companions were returning home one night after being entertained by a friend on an estate just outside Paris. The year was 1648—or thereabouts—and the



THE MOON IS A WORLD SUCH AS OURS.

country sky was neither cloudy nor besmirched by smog. The moon was full, and the party had several miles to walk. All eyes were attracted by the "ball of saffron" in the sky. Since this was before the day of rapid transit, there was time for speculation about the nature of the moon.

All views, except Cyrano's, reflected a belief in a finite universe that was enveloped by a solid firmament: the moon was some phenomenon of the huge sphere that surrounded the Earth. One of the party, perhaps somewhat inebriated, thought it to be a tavern sign. One, with quiet sense of humor, assured the sauntering group that the moon was the copper ironing board on which Diana pressed Apollo's collars. A third thought it was the sun itself, spying on nocturnal man through a peephole in the firmament. The last of Cyrano's companions, no doubt the religious friend, was sure that the moon was a window in the sky through which Heaven could be glimpsed. Yet all laughed when Cyrano offered his views.

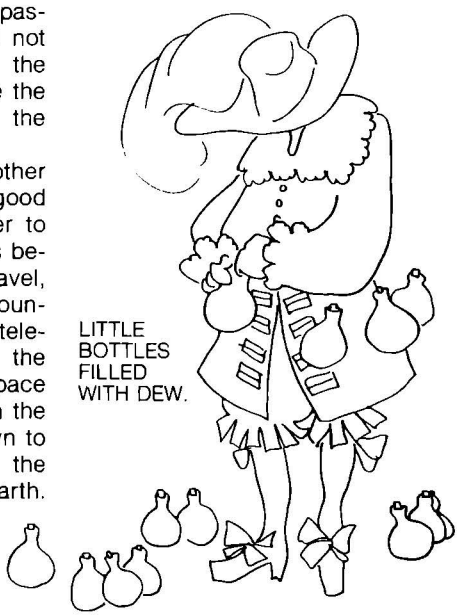
Our hero stated flatly that "the

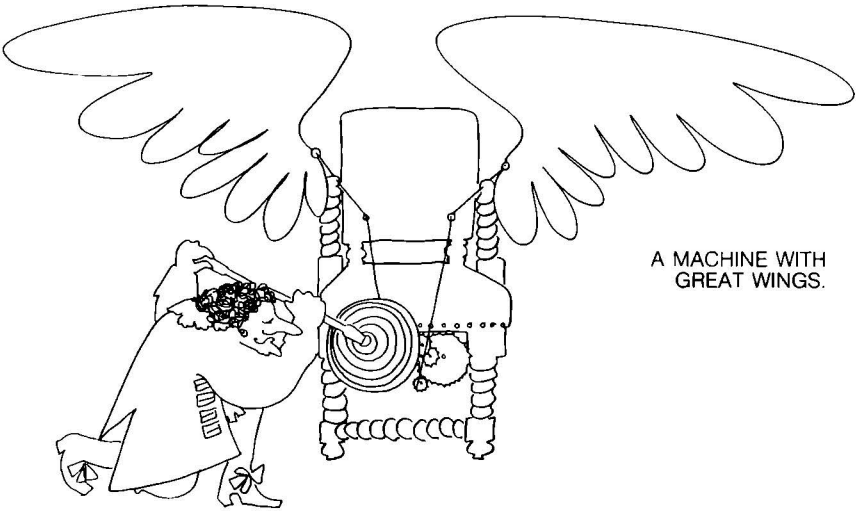
moon is a world like ours which our world serves as a moon." He added, "And that, perhaps, is just how someone else is being ridiculed at this very moment in the moon for maintaining that this globe here is a world." Cyrano drove home his point further by informing the party that some of the ancient Greeks, as well as astronomers of their own age, Copernicus and Kepler, were of the same opinion.

This bold statement of the new astronomy provoked not only derisive contradiction but an argument that lasted long into the night, only ending when the moon had set and the sun rose to take its place. In defending his view, Cyrano became more sure than ever that he was right. On arriving home, he chanced to read from an old book supposedly telling of a visit to the author by two lunar inhabitants. Thinking that it was a miracle to find such a passage in a book that he could not even remember taking from the shelf, Cyrano resolved to settle the whole question by going to the Moon.

If the Moon was indeed "another world," it would be made of good solid dirt for the space traveler to stand on. Less than forty years before Cyrano wrote of space travel, Galileo had seen the rugged mountains of the Moon through his telescope. With that observation the Italian had given purpose to space travel. Perhaps forests grew on the mountains and rivers went down to the seas. It might be, then, the Moon was a better world than Earth. It was not difficult to imagine that the Garden of Eden was on the Moon.

Cyrano's friends were merely stating the accepted views of the times, for the Seventeenth Century was not a time of ready acceptance of new discoveries or ideas. Galileo wrote to Kepler, "Here at Padua is a principal professor of philosophy, whom I have repeatedly and urgently requested to look at the moon and planets through my glass, which he pertinaciously refuses to do." Indeed, there was active opposition to any new thoughts. One learned professor said, "You have made me see this business so plainly and sensibly that, did not the text of Aristotle assert the contrary—I should be constrained to confess your opinion to be true."





A MACHINE WITH GREAT WINGS.

That the Moon is another Earth may be old hat to Twentieth Century man, but it was a radical view in the mid-Seventeenth Century. Cyrano, believing it himself, could write an interesting story about a walk on the Moon.

Now Cyrano offered himself up to heaven. All about his body he fastened small bottles filled with dew. He had found it appropriate to retire to an isolated country place for lift-off. There is no dew in the city and the fields of a large farm would be required for harvesting the amount Cyrano required. When the sun beat upon the vials it attracted the dew so that Cyrano rose until he found himself in the middle region of the air. He seemed to be going too fast and in the wrong direction. Cyrano broke several of the little bottles to slow down, but he also wanted to change direction. Thus, Cyrano invented space maneuvering and velocity control. Unfortunately, as so often happens with first-time experiments, Cyrano overcorrected and fell back to Earth.

There is very little to be said about this method of space travel except to apologize. We should, in fairness to Cyrano, point out that he was writing well in advance of the acceptance of atomic theory and an understanding of evaporation. That the sun draws up the morning dew or mists is an old belief. Who has not seen a misted shaft of sunlight slanting down through a dark storm cloud and been told that the sun was drawing up the water? Cyrano believed that evaporation was caused by an attraction between sunlight and water. Since the glass bottles were transparent, they did not interfere. As the dew was lifted, so would be our hero.

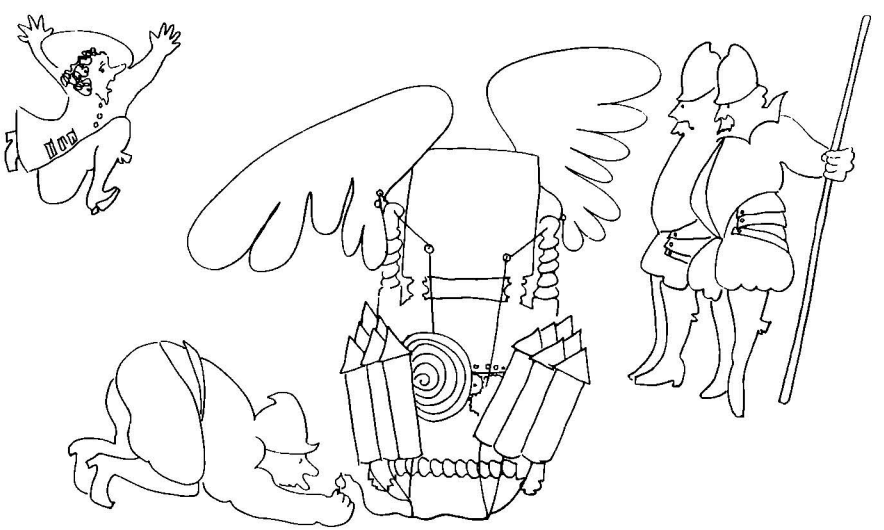
Cyrano was anticipating the hot air balloons of Joseph and Jacque Montgolfier by almost one hundred and fifty years. The brothers had ob-

served the suspension of clouds in the sky. It occurred to them that if they could enclose in a bag any vapor such as a cloud, it would rise and carry the bag with it. On June 5, 1783 they inflated a large linen bag with smoke from burning straw to demonstrate the first balloon. When released, it arose to a great height and traveled about one and a half miles before descending. That their balloon contained hot air as well as smoke was chance. Cyrano should be given the credit for first trying lighter-than-air craft.

When Cyrano landed back on Earth, he was surprised to find it still midday when it should have been midnight. The natives told him that he was in French Canada, a distance of perhaps thirty-four hundred miles from Paris. It was a flight record not broken until October 1928 by lighter-than-air craft when the *Graf Zeppelin* crossed the Atlantic Ocean in four days, fifteen hours and forty-six minutes. As for speed, Cyrano held the record until April 26, 1939 when Captain Fritz Wendel flew his aircraft 469.22 miles an hour.

Not resting on his laurels, Cyrano resolved to try again. After a night as a guest of the Governor he went to the top of a small hill and built a flying machine. He reported very little of the design except that it contained "the device of the spring" and that "the motor was agitating its great wings."

SOLDIERS ADDED STRAP-ON ROCKETS.



Cyrano's start was not entirely impractical. The earliest attempts to fly had relied on wings attached to the arms or legs, but by the Seventeenth Century it was recognized that a lightweight power source was needed. The coiled spring had been used to drive mechanical clocks since the Fifteenth Century. Robert Hooke began experimenting with flying machines as early as 1655 and by 1660 had a spring-powered model that lifted itself in the air. Scale-up to Cyrano's size is an accepted aerospace engineering procedure.

Despite its ingenuity the huge locust was not flightworthy, and Cyrano tumbled into the valley. Undaunted, he returned to his room, greased himself with beef marrow for his aches and comforted his heart with a bottle of cordial. Then he set out to recover his machine. Soldiers had carried it to the marketplace where they had added strap-on rockets. (The credit that is usually given to Cyrano for first conceiving of rocket power for space travel should go to some unknown and unnamed Canadian soldier.) Cyrano, attempting to prevent their ignition, found himself launched. The rockets were properly staged. When one bank of six burned out, another line was ignited.

The soldiers had intended to make the flying machine look like a dragon breathing fire and smoke. The rocket, in Cyrano's day, was only an amusement piece. When Henry VIII of England met Francis I of France on the field of Cloth of

CYRANO WAS LAUNCHED.

Gold in 1520, part of the entertainment was "a great salamander or dragon, artificially constructed; it was four fathoms long, and seemed to be filled with fire, very horrible and terrible." It traveled "with an undulating motion, as fast as a foot soldier could travel, as far as Guisnes, mounting as high in the air as a crossbow would carry an arrow."

Cyrano de Bergerac was on his way to the Moon, yet his rocket machine was only first-stage propulsion. It was well known in the Seventeenth Century that the Moon (Diana) on the wane, "draws forth to fill her crescenthorn, the marrow of bulls and goats." Thus, the beef marrow that Cyrano had used to soothe his battered body was pulling him to the Moon. If this was nonsense even in the Seventeenth Century, at least it had the attributes of sound aerospace principles for upper-stage propulsion: high specific impulse and low inert weight.

One can imagine the launched Cyrano headed for the Moon with his nose in the lead, arms flattened against his sides and body straight as a Saturn rocket. When he had traveled about three-fourths of the way from Earth to Moon he found himself falling headfirst, although he had not somersaulted in any fashion. He noticed the change because he felt the weight of his body on his head. Cyrano reasoned that the Moon, "being smaller than our Earth, must have a less extensive sphere of influence, and in consequence I have felt the pull of its center later."

The null point of the Earth-Moon gravitational field is nearly five-sixths of the distance from our planet to the Moon, so Cyrano's estimate was reasonably accurate. More doubtful is that a Moon tree could have cushioned his landing, but it did. Cyrano recovered consciousness to find himself entangled in two or three large branches that had been broken off by his impact. Climbing down, he soon met the prophet Elijah, who told him that others had preceded him.

Elijah had made a light chariot of iron, then extracted in a furnace the attractive principle from a loadstone and reduced it to a medium-sized ball. When he cast the ball into the air, the iron chariot was attracted upwards. Repeated throws carried him to the gravitational field of the Moon. He maneuvered to a satisfactory landing site by casting the ball horizontally. Finally, an upward toss of the ball reduced his fall to that no more violent than a jump.

Enoch had sealed the vapor of a sacrifice in two large metal vessels, attached them under his armpits and was carried aloft by the tendency of smoke to rise. On reaching the Moon, Enoch released the vessels and descended to the surface gently when the ample skirts of his robe served as a parachute.

Cyrano also met Dominique Gonsales, the hero of Bishop Godwin's "Man in the Moone," which was first published in 1638. Gonsales had made his journey in a flying machine lifted by gansas, a type of swan that migrated between Earth and the Moon. This was not an incredible scheme to an age when the

migration of birds was little understood. Homing pigeons have flown an estimated seven thousand miles and the bar-headed goose regularly migrates over Mount Everest.

Cyrano returned to Earth as honorless as any other prophet, was counted as a demon and madman and in league with the devil. One accuser said, "I never saw a sorcerer but had dealings with the Moon." Eventually jailed in a high tower, he planned to escape by building a new propulsion device and journeying to the Sun.

For eight days, he hammered, planed and glued to build a six-foot-high and three-foot-wide box that shut very tightly. The craft had holes in the bottom and over the roof. The neck of a crystal vessel in the shape of an icosahedron fitted exactly at and in the hole in the top of the box. The twenty facets of the vessel were convex-concave to serve as condensers of the sun's rays. The box had four ports in the vertical sides for observation. It was equipped with a wind clock, an artificial eye to see at night and a planetarium. A small, very light plank served for a seat. Cyrano steered the box with a string attached to a small sail.

When the sun shone on the transparent icosahedron and its rays were focused in the box, the air was rarefied. More air rushed in through the bottom hole and out the top, lifting Cyrano and his space box. Earlier chronicles have credited Cyrano with inventing the ramjet for his last space venture. If true, it is certainly an advanced type. The flow is opposite to that of the Twentieth Century ramjet. The flight to the Sun was successful so his engineering cannot be criticized.

What Cyrano said and heard on the Moon and Sun will be found in "Other Worlds," from which these aerospace facts have been extracted. The book was first published two years after his death, but private circulation had made him famous while he was still alive. It may have caused his death in 1655, if the story is true that Cyrano died of foul play when the agents of the Church caused a wooden beam to fall on his head. Or perhaps he died of the venereal disease he had contracted ten years before.

So we have uncovered another Savinien Cyrano de Bergerac. The first was the poet, duelist and pathetic lover of Rostand's play. The second was the brilliant scholar who, although well-read in the emerging science of the Seventeenth Century, would poke fun at those who strove to understand it. The third Cyrano belongs to the aerospace age ■

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PIGEON CITY

In biological evolution, natural selection can take place
over many generations, lasting for eons.
In social evolution, there's not enough time for that.
But, if you realize that
"only the game fish swim upstream . . ."

JESSE MILLER

JACK GAUGHAN

Summer dawn. The sun had about risen and Curtiss pushed back the fire door and emerged on the roof. He breathed deeply and happily, the brightening sun warm on his face. He drank in the early morning sun, and it bathed his strong black features until his face shone like copper.

Curtiss had the most magnificent coop in Harlem. Built and added to over the years, it was more like a miniature pagoda than a coop. Curt loved these moments alone before he flew the birds. The coop stood in a corner of the roof. It was red and gold, and it shone quietly, the birds within cooing and rustling as they awoke, preening and stretching.

He would prolong these moments as long as possible. Once the birds were released, they would fly and whirl: so many specks of pepper in a shifting pattern that always seemed to be on the verge of spelling something. The whole city could enjoy them. But for now, they were only his. The plastiscreen reflected the pink early morning light, and Curtiss wanted to sing; he was bursting with quiet joy and pride.

Below on Lenox Avenue, a mechisweeper was making its automated rounds past the empty, abandoned buildings across the street. Curtiss half watched as it stopped before an obstacle. He imagined he could hear computers chattering as the sweeper analyzed the obstruction. The night before, a car had been burned, and now there was a heap of melted hardened plastic at the curb. The sweepers almost never erred. A cold light swept the street, shone on the plastic mess, and dissolved it. Curtiss was unimpressed. He watched as the big brooms began again to rotate, and the sweeper lurched off into the next block.

He had once wondered about the cost of one of those mechisweepers, but an eduvision program had compared the operation of the sweeper with the selection of a floor by an elevator. The whole thing had been made to seem so practical and uncomplicated. A narrator had suggested that it was vastly more efficient to automate wherever possible, rather than hire and maintain human operators.

Curtiss shrugged and walked to the coop. He spoke to the birds. "What's the difference? Life is good, we all eat, hey?"

The birds knew their time was coming. They finished primping and hopped about with quick, jerky movements. He unlatched a few doors, and they began jumping to their little exit ledge, looking around, and then flying off. Curtiss felt a touch of envy. The pigeons would go where they wanted, see and be seen by anyone, while he waited on the roof until it was time to eat. All there was for him to do was eat, sleep, and tinker with his coop.

No one went downtown any more. Of course, some people were reclaimed when they interfered with the operation of a city machine, but

they never returned, and over the years the curiosity had finally dissipated. It didn't seem strange to anyone that there was no curiosity. All needs were met. Everyone was fed and clothed, housing was adequate. The people had become lethargic.

Curtiss tilted his head back and watched as the birds formed up, whirling and diving above him until they drifted away, an airy, perpetually breaking wave, constantly forming and reforming, hypnotically growing smaller.

They called this roof where Curtiss spent his days "Pigeon City of 112th Street." He sighed and went to the toolbox. There was never a question of not having enough materials. The super filed a monthly requisition form, and it was easy to get him to include a pint can of metallic gold paint or a few yards of plastiscreen.

Everyone knew the computers downtown kept track, but no one minded as long as all needs and most wants were satisfied. Curtiss rubbed his eyes and selected a small brush. He spread some paper and began to paint. The computers encouraged everyone to have a hobby. No requisition for a hobby was denied. The fact that the computers kept track was confirmed by their handling of Allen, the throwback, the dissident, the exception who proved the rule of general content.

The sun was up now. Curtiss took off his shirt and draped it on the knob of the fire door. It was warm, it was good. He hummed softly as he painted. The sun baked his muscles as he stroked the plastiwood. Life was easy, so sweet. The eduvision said the ghetto represented man's first arrival in Utopia.

Allen cropped up again in Curtiss' head. There was something righteous in the way Allen had complained when he had been cut off by the computers. There was data assembled on Allen, just as there was data assembled on everyone else, but Allen had requisitioned dynamite. It was a joke. Under "reason" Allen had written, "hobby." He had been given the explosive, but his subsequent requests were turned down. Allen had even been mentioned on eduvision. He was a local star, a source of real entertainment, like Curt's pigeons.

The people knew how Allen felt. Allen hated. As a child in the street, he had lost his foot. It had happened when he played with a mechisweeper. It was all right to climb on back and go for a little ride, but to obstruct it, to scream at it and taunt it as Allen had was lunacy. When the sweeper's computer had elected to override interference due to Allen's antics, and he had seen that he would be ignored, Allen had dashed in front, trotted backwards, laughed and shouted. Then he had tripped and fallen . . .

It was time to eat. Curtiss carefully set his brush in thinner and capped

the paint. The sky was blue and cloudless. Soon it would be fall. Impossible beauty, peace and happiness were all around him. He strode to the fire door and into the dank tenement on which he played and dreamed.

All hobbies were done on roofs. The buildings' interiors were generally squalid. No one seemed to care. Live and let live, and when things spilled over into the streets, there were the mechisweepers.

The lunch truck was actually another sweeper, but it was modified to dispense food. It scanned cards and issued infraheated food especially programmed for the individual's dietary needs. The computer was benevolent. Everyone ate well, even if only once a day.

Allen hobbled up behind Curtiss in the line. "Mind if I bump you?" he whispered.

"Why?" Curtiss replied. "In a hurry?"

"I sure am, brother," Allen said. He produced his card and fingered it nervously.

"Well, I'm in a hurry too," Curtiss said. "You'll have to wait."

"I can see you're in a hurry." Allen laughed and seized one of Curtiss' hands, holding it up to embarrass him. It was flecked with paint. "Yeah, you're in a hurry," Allen continued. "You're messing around up there in your Pigeon City so tough you don't have the time to put on a shirt or wash your hands when the roach coach gets in."

Curtiss relented. "O.K., brother, take my place."

Allen moved up immediately and began to tap the shoulder of the girl in front of him. "Excuse me, sister, mind if I move up?"

Curtiss watched with amusement as Allen cajoled and bargained his way to the head of the line. "He always has to be different," Curtiss said to no one in particular, and the girl in front of him shook her head and smiled. By the time Curtiss reached the window of the roach coach and presented his card, Allen was off the line and half finished with his meal. Curtiss took his tray and joined him on the steps of the building.

"What were you in such a hurry for?" Curtiss asked, sitting down beside him. Allen squinted up at the hot, midday sun and did not answer, but returned to his nearly empty tray, scooping and bolting his remaining food.

The roach coach clanged and rattled away, across Lenox Avenue. Curtiss leaned forward and he could see people clustering in the next block where they knew the coach would pull up.

"Do you like this?" Allen said suddenly.

"What?" Curtiss was confused. He knew to expect anything from Allen, but he was still often taken by surprise. Allen stood and wiped his mouth on the back of his hand. He was tall, and he looked proud. His limp enhanced his different ap-

proach, and he knew it. Curtiss sensed a speech was coming, and he tried to cut Allen off.

"Look, brother, I only asked you why you were in such a hurry. Don't give me any lectures, O.K.?"

But Allen had drawn himself up to his full, crooked height, and he would not listen. Up and down 112th Street, the people were slowing in their eating. There would be entertainment. Allen would talk. They began to gather around, and Allen drew them in with regal sweeps of his arm. He turned to Curt.

"I asked you, 'Do you like this?' and you didn't answer. Does this mean you don't know?" Allen was using his speech voice, and a girl giggled. Curtiss lowered his head. He longed to be back on the roof.

"I'll tell you all why I was in such a hurry," Allen thundered. "It was my intention to reach the coach before anyone had eaten, and smash it." Allen looked around and reached under his dashiki. He produced a brick and held it aloft for all to see. There was a startled gasp from the crowd, and everything grew still.

The heat beat down on them all. The street felt sticky. Curtiss sipped his carton of lemonade slowly, trying to conserve its cool trickle in his dusty throat.

"Why would you do a thing like that, son?" It was an old woman the people called "Raisin Face," and her lips moved and worked on her question.

"Why?" Allen yelled. "To make everybody do something, that's why! You think I don't care? I do care. Brothers and sisters, it's us, not one meal that I care for. A single meal? We wouldn't starve, and there'd be another coach tomorrow."

Now there was confusion. The crowd surged, and there were cries of "How do you know?" and "What gives you the right?" They were angry. Allen stood confused and alone. Curtiss had to give him credit for trying to stay cool.

Curtiss stood and waved his arms for attention. Gradually, the noise subsided, and Curt spoke. "Why he would do it is one thing, we can like his reason or not. The fact is, he didn't do it, and I'd like to know why." Attention swung back to Allen, and he blinked gratefully. Curtiss resumed his seat.

"You people want to know why I didn't do it?" Allen addressed himself to Raisin Face. "I got to the head of the line, the brick was in my hand," the crowd leaned forward, straining not to miss a word, "but when I took a deep breath, that food smelled so good, I just had to have some." He pretended to gnaw at the brick, and the crowd laughed. Raisin Face grinned appreciatively.

The tension broke as easily as if it had never been there. Allen shuddered with relief. Mob violence was not unusual and it was almost always fatal to the victim. It had been a close call. He looked over to Curtiss,

but Curt avoided his eye. "I have one more thing to say," Allen called. "There will be a meeting tonight, held by me."

"Where?" The mood of the crowd was eager. The promise of real entertainment was always with Allen's presence in an almost tangible aura.

Allen took a deep breath. "Pigeon City," he replied at last.

Curtiss jumped, spilling some of the precious summer lemonade, but Allen was already limping off down the street and the crowd, buzzing with excitement and anticipation, was breaking up.

The hot afternoon wore on. People returned to their respective hobbies. From the roof at 112th and Lenox the intermittent "tok, tok, tok" of a hammer floated out over the lazy, heat-bound streets. Curtiss was back at work in Pigeon City.

Allen had joined him on the roof. He hobbled this way and that, almost apologetically offering help.

"Need some nails, man? Can I get you some nails?"

Curtiss could not help smiling. He looked up at Allen's eager tan face and willing brown hands. "What's with you, brother?" he said at last.

"Nothing, nothing," Allen quickly replied. He limped away to the tool box, and Curtiss sat down in the shade of his coop, lighting a cigarette and watching his friend.

Allen smelled the smoke and came skipping back. "Where'd you get that?" he demanded. He handed Curtiss a wrinkled bag with a nail sticking out of a corner and snatched the cigarette.

"I requisitioned it," Curtiss replied casually.

Allen puffed greedily, and the smoke caught in his lungs. Coughing, he handed it back. "Here man, I don't smoke."

"Neither do I," Curtiss said. He clipped the cigarette and carefully tucked it in his shirt pocket.

Allen was fascinated. He took off his dashiki and hung it near Curtiss' shirt on the door. Curtiss was startled to see how skinny Allen was as he sat down beside him in the shade. His attitude had become conspiratorial.

"You requisitioned cigarettes, and you don't smoke." Allen paused and stroked his chin as though he needed time to really think. "Why?" he suddenly demanded. "For someone else?"

"Nope," Curtiss replied simply.

"Well, why then?" Allen's eyes were narrow.

"Because I wanted to see if the computer would send them, that's all." Curtiss seemed a little annoyed, and Allen knew he was embarrassed.

"You wanted to see if the computer would send them and it did. So I was wrong, is that it?" Allen was smiling. They were well aware of what Allen referred to: After the computer had put two and two together, figured out that Allen was making bombs, and restricted his requisition, Allen had loudly pointed out to everyone that if he could be

restricted by the computer today, someone else might get the ax tomorrow. "Policy is subject to change," he said, and no one acted as if he cared. Although his point had struck home, it had never been tested. But the seeds of doubt had been planted. Allen took Curtiss' behavior as proof, and he was glad.

He clapped his hands and stood up. "That's what I love about you, brother, you're so open-minded." Before Curtiss could reply, Allen limped to the door, grabbed his dashiki and started down the steps. The door was swinging shut behind him and he called back over his shoulder, "I'll see you tonight."

Curtiss was alone on the roof again. "Yeah, catch you later," he said, almost to himself. He got to his feet and scanned the sky. Soon the birds would begin returning. Curtiss was worried. He frowned and moved around the roof, making ready for the arrival of the first pigeon.

The pigeons were all back in the coop. The roof was crowded with laughing, eager people. The word had spread. Allen looked around and paced the roof with unconcealed delight. Hundreds of people had responded to the possibility of being entertained by their local star. To make them act was another matter, but Allen had a plan. Tonight, he would do more than entertain.

"This meeting is hereby called to order," he said solemnly. He waved his arms and called for attention, but was only met with jeers and laughter. Allen nodded and waited. The setting sun dyed his face a deep bronze color. Here and there on neighboring roofs, Allen could see knots of people standing and talking. A breeze came up from the east, and Allen's old-fashioned dashiki ruffled and flapped. It was getting cooler.

"What time is it?" Allen asked. The people were startled. No one paid much attention to the time anymore. To show concern for time had fallen out of fashion. There was simply never a need to worry about the time.

"About 7:30, brother," someone finally called. The people grew quiet and began to watch Allen. He nodded his thanks and started to talk.

"I'm not going to say, 'Nobody has a job,' because no one cares to work. I'm not going to say, 'No one that's retrieved ever comes back,' because we all know that, but we act like the only solution is to stay in line and we won't get in trouble."

A commotion was boiling up in the rear of the crowd. "What are you supposed to be getting at?" a man called, and he was pushing his way to the front of the crowd. Allen could see as the man came closer that it was Franklyn. His mouth was twisted on a piece of hard candy. Franklyn always had a piece of hobby candy in his mouth. He made it. Allen folded his arms and waited. Franklyn's manner was threatening, and Allen knew it would be best to let him talk.

"Let him pass!" he called, and Franklyn elbowed his way to the front.

"What are you getting at?" Franklyn demanded. He stood close to Allen's face and Allen caught the vague odor of lemons on Franklyn's breath. He could hear the candy rattling on his teeth as he spoke, and he could not help smiling. Franklyn became furious. "Don't laugh, brother," he screamed. "You're a troublemaker, do you know that? You're not satisfied unless you're making waves."

The crowd murmured appreciatively. Conflict. So soon. Variety. They ate it up. Allen wet his lips. Frank was taking rope, warming to the crowd. He pushed his finger at Allen's chest. "Someone should set you up to get retrieved," he said menacingly. "Then we'd have you out of our hair." Franklyn turned his back on Allen and began to address the people.

"They retrieved my only sister because of his mouth," he shouted. "If we pay attention to this fool, we'll all be in trouble." Frank's voice was rising. "This is the fool that got Irene to interfere with the police." He sobbed suddenly, but forced himself to go on. "They retrieved her . . ." His voice broke and he could not continue. Frank waved his arm at Allen, who stood quietly behind him. He hid his face in his hands and stood helplessly immobile.

"I was with Irene," Allen said at last. "I believe in what we did."

Franklyn whirled. "But they took her, and you got away." He shook with emotion, and Allen put his hand on Frank's shoulder.

"You pretend you don't care, we all pretend we don't care, but we do. You see, we do." He raised his voice and addressed the rest of the crowd in the fading light, his hand still on Frank's shoulder. "We eat the meals the roach coach dispenses," he said. "And we don't dare act strange for fear it won't come back. If the vans came to retrieve, we'd go along quietly for fear there'd be heavier retribution."

The mention of heavier retribution sent a shuddering wave through the silent crowd. Heavier retribution was a reference to the eduvision tapes they had been shown after the riots in Bedford Stuy. No one could forget the films of people doped and gassed, rounded up and herded into vans. Mass reclamation. All those people, never to return to their hobbies, their families, their community. A white voice intoning off camera while the horrible scene was enacted: "This is the fate of the greedy, the destructive, the ignorant . . ."

Heavier retribution. The thought of it brought to mind those nightmare tapes, purposely designed to be unforgettable, obviously intended to keep the ghetto in line.

The black people on the roof of Pigeon City that summer evening had gathered there for entertain-

ment. Allen looked from one face to another. Everyone was quiet and fearful. The breeze gently moved Allen's dashiki about him like a flag. At last he said, "Tonight, we will all fight."

There was no response. Franklyn stood with his shoulders bent and the people avoided Allen's eye. "Who will we fight, brother?" Curtiss called from the back of the roof, and his question hung in the air unanswered. Allen's head was bowed, and he did not reply. "What time is it?" he asked quietly. He seemed mildly disappointed about something. Now no one answered him, and there were some who stood to go.

Haroooom! A tremendous explosion suddenly lit up the night sky with a flash that caught everyone by surprise. It was followed by two more explosions and flashes, and the crowd stood out clearly with each brief, stupendous gush of light. Whistling fragments of metal, pieces of building and shards of glass shot through the air. The people's mouths hung open, and Allen looked around craftily from under his brow.

There was fire, bright and hot. The abandoned buildings on the other side of the street had somehow burst into flame and where their shells had stood, there was now a wall of undulating red and yellow flame. The people got to their feet. They could see everyone turning in this direction for blocks. This was history. The biggest explosion and fire in the city anyone could remember.

Already there was the stench of melting plastic, and the blaze was spreading. There were secondary explosions; powerful concussions that rattled doors and windows. Men and women were running in the street as far as the eye could see.

At last, there came the wail of an approaching siren. A mechi-engine. The people began to cheer. The mechi-engines were a pleasure to watch. They selected the core of a big fire and subdued it with computer-directed foamers, never erring.

Allen was becoming more and more excited. The people were crowding to the parapets to watch. Could one mechi-engine handle a fire this big? There was really very little doubt, but the fire blazed, roaring and radiating heat for blocks around. Lenox Avenue was a scene from hell.

Allen stood and listened. The sirens drew closer. His fingers were curled around the same polyethylene brick he had brandished that afternoon. The engine hove into view, rounding the corner at 110th and swinging north on Lenox. The crowd cheered it on. Allen knew no one would let him throw the brick if he was spotted. He stuffed it under his dashiki and waited. He would make everyone fight before he was finished.

Someone touched his sleeve. It was Frank. Their eyes met in the red glow of the fire. Frank's face twisted in a silent question: "You?" Allen

nodded. Frank's eyes gleamed and he too picked up a brick; together they waited.

The engine had slowed in the street. It was selecting the best spot from which to attack the fire. The siren stopped and the people could hear the whine of heavy-duty electric motors. The engine was like a bull preparing to ram the heart of the fire. It cruised slowly up the street, sensors out and working, and it was like an animal. Closer, a little closer, the great golden bell clanged slowly as though the mechi-engine was thinking.

Allen knew if he didn't act soon, the engine would grapple with the fire, win, and leave unmolested. He stood and hurled the brick, quickly stooping and following it with another.

"Fight, fight, fight!" he screamed. Frank was throwing bricks beside him. The crowd watched, amazed. The stunned people looked on as the unlikely pair threw bricks, bottles and whatever they could get their hands on.

The engine began again to move. Frank stopped and froze, seized with panic. The engine was coming with surprising speed, and it was ignoring the fire. It squealed to a stop almost directly below Pigeon City. Allen could almost hear the computers whirring and clicking. A ladder was climbing toward them, a hose at the edge. The crowd stood transfixed. All eyes were on that hose. "Gas," someone whispered fearfully.

The ladder extended, smoothly, slickly reaching for the roof from which the bricks had been thrown. The engine was programmed to pick up the dissidents; the fire raged on unchecked.

"Fight! Fight!" Allen screamed. He tore a loose brick from the parapet and threw it. It struck the onrushing ladder and bounced harmlessly to the street below. "Fight or be retrieved," he yelled. That did it. First one and then another citizen joined in the fray. The ladder hesitated under the bombardment of bottles and bricks. The hose began to spew gas prematurely, still a few floors below. The ladder weaved like a cobra. The people cheered. It was the first time a machine had been deterred, but it was still coming. Everyone knew it would get them unless it was rendered absolutely unfunctional. The missile throwing became serious, the marksmen among them taking careful aim before throwing whatever small or large objects they could find.

Curtiss tapped Allen's back. Allen turned, and the two friends eyed each other in this moment of crisis.

"Help me," Allen said simply. "Help."

Curtiss beckoned to Allen and together they walked through the intent crowd of fighting men. Allen stopped when they reached Curt's coop; he understood immediately. They went behind it and gave a mighty heave. The coop rocked a little, but it wasn't until others came

and lent a hand that they were able to budge it. Under pressure of massed coordinated effort, the huge coop finally yielded. It toppled over on its side, and the birds within squawked and complained. Feathers drifted inside the plastiscreen enclosure. The men pushed the big coop, and it went side over side through the crowd, leaving a trail of broken bits of plastiwood.

At last, the coop stood ready on the roof's edge. The ladder was a few yards away and climbing, bricks and bottles pelted the engine below. The people could easily hear sensors clicking as the ladder probed and sought. The hose spit thick yellow gas.

Three men began to rock the coop. "One!" they shouted, and it tilted a little, then swayed in again. The men met the return swing and pushed back. "Two!" The massive coop swung far out over the street and slipped a little before swinging in once more. "Three!" they shouted, and the pigeons were gone forever. Everyone ran to watch as the huge coop disappeared over the edge of the parapet, smashed into the extending ladder and hurtled straight at the engine below.

It snapped through two clotheslines on the way down, and by the time it struck the engine in the street it was an impossibly huge crate, shrouded in flying sheets and flapping assorted clothes. Broken ropes whipped the air around it and it struck the engine with a tremendous crash, crushing it under its colossal weight and impact.

A machine had been beaten. The roar of the fire was a lullaby. The street had gone suddenly quiet. A machine had tried to get them, and they had stopped it. "God," someone whispered, and everyone turned, startled.

The fire seemed to blaze with renewed life. It devoured and spread, eating and destroying unhampered.

Everyone rushed down to the crippled engine. It lay smoking and twisted, and there was glee to the point of madness. The liberated crowd pounced on the disabled machine and began to rip off parts, running and dancing. Allen reached the street a little after the others, and he hobbled impotently from man to man, begging them all to stop. The mob laughed and celebrated, ignoring Allen.

Curtiss was a hero. The fire roared on unimpeded now, and melting plastic began to flow in the street. It was like liquid wax. It immediately began to harden. Children rolled the cooling stuff into balls and threw them back into the fire, then, laughing, at each other.

There was great jubilation, but Allen hobbled quickly from one man to another. "Stop!" he yelled. "Get off the streets! Get off the streets!" He was beside himself, but the people would not listen. Allen was going hoarse.

He spotted Curt. Curtiss was sitting on the curb in the flickering shadows. In his hands, he cupped a broken and dying bird. Allen scrabbled over to him and squeezed his shoulder. Curt looked up slowly, but he did not seem to see.

"Curt, Curt, I can't make them stop. They won't listen." His face was twisted with fear and emotion. Something in the urgency of his voice broke through, and Curt slowly got to his feet, leaving the pigeon on the ground beside him.

"Listen to what?" Curtiss said softly.

"The sirens, man. The sirens! The vans are coming!"

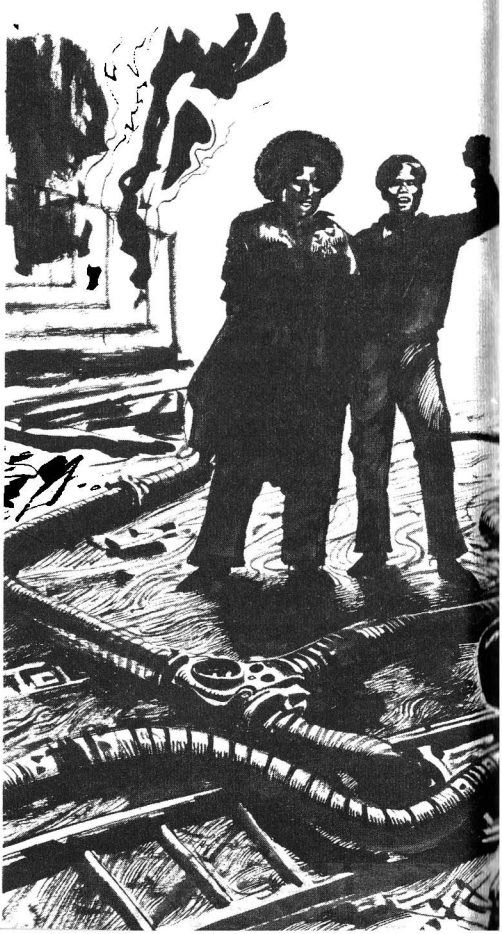
Curtiss cocked his head and listened carefully. Sure enough, over the noise of the fire, the roar of the jubilant crowd, drifted the distant whine of approaching multiple sirens. The riot vans. Slowly, Curtiss turned and faced Allen.

"Listen Curt, we've got to . . ."

But Curt would no longer listen. He clenched his fist, and suddenly swung with all his might so that Allen caught it in the pit of his stomach and went down, twisting and gasping.

"You've gone too far," Curtiss hissed. "You talk too much. You always talked too much." Curtiss drew back his foot. He shook with hate and fear.

Someone spotted him and ran over. It was Franklyn, happy as a lark in the dancing glow of the blaze. "Curtiss, what are you doing,



brother?" His mouth worked on the ever-present lemon yellow candy. "What do you think you're about to do?" He laughed and seized Curtiss, spinning him away from Allen.

"What am I about to do?" Curtiss pushed Frank off. "Listen, brother. Just listen, and you tell me what I'm supposed to do."

Then they listened together, and by now, the wail of the mechivan's sirens was much closer. "No," Franklyn whispered softly.

But it was undeniably true. The sirens were very close now, unmistakable even above the snarl and crackle of that magnificent fire. One by one, the men stopped running in the streets, until Lenox Avenue was filled with trapped rioters. They stood, rooted to their places like so many chessmen. Guilty children caught with their hands in the cookie jar. The fire was a tall red beacon, telling on them. Someone looked at it as though he wished it would go away.

One man had the dead engine's bell, and he looked around cunningly before stuffing it up in his shirt. Then he too froze, but the machine's gold bell dropped to the street and began rolling toward the gutter, clanging sadly.

There was nowhere to run. The vans could be heard encircling the block now. Curtiss turned and walked away. He knew he too would be retrieved, but he had to be as far from Allen as possible. Allen forced himself to rise and follow Curtiss.

His steel foot made keeping up difficult, but he persisted, scurrying after Curt and calling to him.

"Listen to me," Allen was saying. "Would you please listen?"

"Get away from me, Allen." Curtiss' voice was bitter. The hands swinging at his sides were fists. "I'm warning you, brother, stay back. You've done enough."

Allen took a deep breath and struggled to keep pace. "Just two words, brother," he panted. "Please let me say these last two words."

Curtiss was furious, but he spun and waited, glaring at Allen. Allen caught up. He looked like a madman in the reflected firelight, the people around them stood stock still waiting for their roundup as helplessly as cattle.

"What two words could you possibly have for me that could change any of this?" Curtiss said sadly.

Allen reached under his dashiki and produced two gas masks. His eyes gleamed wickedly, and he said, "Trojan Horse."

The gas began to wear off. One by one, the group from Pigeon City was awaking. Franklyn stretched and yawned, and Allen stood over him, his hands on his hips.

"Good morning, Sleeping Beauty," he said. Franklyn glared at him and dug in his pockets for a piece of candy before responding.

"Where are we? What time is it?" he mumbled, broadcasting lemon. He sat up and looked around. He was on a cot, in the midst of a large number of cots, all occupied by the people from Pigeon City.

"You know where we are." Allen was deliberately antagonistic. "You don't want to know what time it is, you want to know how long you've been out. What makes you think I know the answers anyway? I thought you said I'm a fool."

"Just look at you," Franklyn replied. "Check yourself and your buddy over there, and even you can see it's obvious you've been up to something." He nodded toward Curtiss, who stood in the middle counting the cots.

"That's right." Allen moved closer to Franklyn. "We've been up to something, we've just been going along with the program to see what happens."

"So? What happens?" Franklyn saw that the room was huge, at least three times the size of a big gym. The floor was plastiwood, and sunlight filtered through a set of municipal-style windows that extended the length of the hall. Under the windows were a set of doors marked 1, 2 and 3. The tile walls gave everyone's voice an indoor swimming pool ring.

"Nothing happens," Allen said after waiting for Franklyn to take in their surroundings. "The vans took us here, all automatic and smooth as you please. The gas made everybody kind of doped . . . you all just stood there in the street. Nobody on the vans to see Curtiss and me with our gas masks on. Voice like the ones on

eduvision tapes told us to get into the vans, and you all climbed in, nicely. When we got here, the voice told us to get off and we marched in here . . . You don't remember?"

"No, I don't remember." Franklyn scratched his head.

"Well anyway, Curtiss is counting the cots to see how many people we've got here. That's what we were doing when everybody started to come ungassed."

Franklyn rattled his candy against his teeth. "You're really one for the books, you know that brother?" he said.

"Seventy-six, exactly!" Curtiss called from across the floor, and he began to stroll toward Allen and Frank.

"Thanks," Allen said.

"Thanks?" Franklyn shouted, and his voice echoed through the great hollow hall. "Man, you actually believe we're going to cooperate with you? You're the reason we're down here in the first place!" The people began to drift over, attracted by the commotion, ever responsive to the faintest whiff of controversy. Franklyn turned and began to address them:

"Listen up, everybody! This is it, we've been reclaimed! We've been taken, and we know who to blame for it . . ."

Allen ran to Frank and spun him around. "What are you trying to do?" he yelled. "We've got to stick together, we can't be fighting anymore." He turned to the people. "Let's be calm, please, just this once, and we can accomplish . . ."

"Why don't you shut up?" a disgusted voice called from the back.

"Yeah," someone added. "Never should have listened to you in the first place."

Allen's light tan face went dark. "I tried to warn you," he cried. "All of you. I said, 'Get off the streets, get some shelter, stop and listen!' But no, you had to play, you had to have your fun. And now you want to blame me." He focused his attention on Frank. "Don't you see, brother?" he said at last.

Franklyn returned Allen's gaze. "Yeah, I see," he replied. "And I see the reason, too."

"You big lemon-eating fool!" Allen screamed. "You may think you see, but you don't see nothin', and you know even less than that."

They began to move toward each other, and the people murmured excitedly. Curtiss intervened.

"That's enough," he said quietly. "This won't get us anywhere. We should be finding a solution, not a culprit."

Frank blinked. "But I was perfectly happy before . . ." and he paused, searching for words while his candy clicked and rattled against the back of his teeth.

"Sure, you were happy, dufus, that's the whole point," Allen snarled, and they moved angrily to close the gap between them. Again Curtiss held them apart, and the crowd grew impatient.

"Let them fight," everyone said.

Curtiss was embarrassed in his role as peacemaker. "I don't want to make any speeches or anything," he said shyly. "I just know we can't waste time arguing and fighting, that's all."

Allen and Franklyn stood glaring at each other, and the people gathered around happily. They would see a fight. Entertainment, variety, conflict. They loved it.

For Allen and Frank, there could be no backing out now. They squared off and put up their hands.

"Go ahead, hit him," the people called. But Raisin Face cleared her throat, and the hall grew still. Everyone turned to hear her speak, her cheeks puffed and inflated like worn dark paper bags. The people strained to catch the sound of her wheezing voice. At last she was ready.

"I don't see any difference between the way you children are acting here and the way you acted back home at Pigeon City." Her cane wobbled as she stretched her rattling chest, taking air before beginning to talk again. The hall was deathly quiet. Franklyn suddenly turned on her.

"What do you mean, 'You children'?" he roared. "What's supposed to be so different about you? I didn't notice you hanging back or acting any different last night at the fire, and you don't look any different to me now." He paused for breath, and Raisin Face shrugged and walked away.

Franklyn was infuriated. "Don't turn your back on me when I'm trying to talk to you!" he shouted, and some of the people looked over their shoulders and at the ceilings, as though they were afraid such a disturbance would bring retribution from a higher source.

Raisin Face raised her heavy cane and turned around.

"And don't you holler at me!" she hissed. She began swatting Franklyn with her thick gnarled stick.

Franklyn covered his face and head, ducking and laughing, he caught most of the blows on his arms or shoulders. "Ow, hey, ouch! Cut it out!" he giggled like a happy child.

But the old lady was surprisingly quick and agile. "Not till you say you're sorry!" she panted, working. The stick whistled and swished, thumping Franklyn across his back and cracking him painfully at his elbows. The crowd laughed joyously. Everyone was happy.

"All right, all right, I'm sorry," he said at last. Raisin Face grinned and relented.

"Won't disrespect me," she muttered as she smoothed her dress.

The hall grew quiet. No one seemed worried or apprehensive but Curtiss, Allen, Franklyn, and Raisin Face. Everyone else had simply acted as though they knew the computer would do what it wanted to, and there was no way to fight it.

The other four moved restlessly around the tiled hall, arguing or talk-

ing, constantly pacing and examining. Chafing within the confines of that huge cold room, they stood among the seventy-six cots and argued. They moved to the opposite end of the long hall, where the prisoners had first stumbled in, and they stood under the huge scoreboard-type affair that hung from the ceiling. They talked and talked, but they could not find common ground. Allen wanted to smash and destroy, to unify the people, use their consolidated strength and break out, find the white people and take them by surprise. He limped back and forth excitedly, but the others were tired of hearing him.

Curtiss saw the need for radical action, but he wanted to stay and learn. "That's because you don't have those silly birds to go back to anymore," Allen said, endangering his good standing with the one person he considered almost to be an ally.

Franklyn ate lemon candy and mumbled about "Allen's big mouth," but he stayed with the radical group because he believed his sister had passed through this same hall when she had been reclaimed, and he knew instinctively it would take radical, or at least, different behavior to find her.

Raisin Face was as ever, the enigma. She puffed and wheezed, and Allen suspected that her only reason for moving with them was their greater entertainment factor.

There was a whistle, shrill, like the piping they had heard in the eduvision tapes of the old Navy. Curtiss looked up and around. They all expected to hear a metallic voice saying: "Now hear this, now hear this, now . . ."

Instead, the people were gasping and turning toward the board over the heads of Allen, Frank and Curtiss. Raisin Face stepped back toward the middle of the floor and looked up. "Come here!" she cried. Allen and the others moved to join her. The board was coming to life. Information went jattering across it electrically:

Jun 6 2066 . . . 76 dissidents . . .
Ten A.M. . . . Pigeon City . . .
112th and Lenox . . .

That information posted, the screen went blank. There was humming and chattering from the board. Most of the people were glad, Allen recognized, and he loathed the whirring and clicking of the computer. It almost always made his foot ache the way rain agitated Raisin Face's arthritis.

The board came back to life, and a display appeared consisting of miniature electronic representations of the seventy-six cots at the end of the hall. Allen and Curtiss looked at each other and said nothing. Franklyn was quiet, for once even his candy was still, and they watched nervously as instructions appeared under the seventy-six cots.

"Proceed to the pallets." The computer spelled it out for them.

One by one, and then in groups of three and four, the milling, tired people shuffled over to the cots. When they were at the pallets, a miniature human silhouette appeared in the corresponding electronic symbol on the board.

Allen saw that it would be useless to hang back and so he limped over with the others and took his place on a cot. When everyone was positioned, an ominous hissing sound began to come from somewhere, but Allen could not be sure where. He sat up and saw that Curtiss too was rising and looking quickly around. Their eyes met and the realization hit them at the same time as the chemical: Gas!

Franklyn tried to fight it. He wanted to stay alert, he wanted to do whatever he had to do to find Irene, but the familiar freezing feeling was spreading in his head, and he began for the second time in less than twenty-four hours to cease to care.

Allen sank back, wondering why he bothered to fight. The gas was a new experience for Curtiss and him. Their masks had protected them on the way down, but now Allen thought, "For what?" and part of his mind was surprised at himself, while the growing, spreading part ate away his will.

Low double doors under the board banged open, but Allen didn't care. He wasn't sure if he was dreaming, and in fact it didn't make any difference to him if he was or not. Not really. Not even when he saw that the doors had swung open to admit a little cart-sized machine which buzzed directly into the room, rolling straight for the seventy-six people lying helplessly on their cots.

The machine began to move from bed to bed. Allen could not always see it, but he could hear it, humming and clicking as it made its evil automatic rounds. His foot ached and he longed to sit up and rub his eyes, but he was too tired. The little monstrosity took pressures, gave injections, and whirred around corners like a mechanical mouse. Allen wondered if the others were aware of what was happening, and then he drifted off.

He dreamed the machine was coming down his row of beds. He tried to move away, but his body would not obey his mind. It paused at his side, chattering and whirring. Allen felt its cold loathsome touch, here, now there, gently probing. He didn't know what the thing was doing, and he was afraid to wonder for fear he would find out.

He became aware that he had been injected with something.

Sensation was returning. He sat up and rubbed his wrists. Curtiss was recovering too, and Allen saw that his friend was laughing.

"What's supposed to be so funny?" he asked.

"You are, brother," Curtiss readily replied. "You and your Trojan Horse."

Allen had to admit Curtiss had a point. After he had gone out of his

way to stay undoped, here he was, recovering just like everyone else. Allen smiled and nodded, but he began almost immediately to try to regain control of the situation.

"How long do you think we've been out?" he asked no one in particular. There was no reply. The doctor machine had finished, and it rolled away through the doors at the far end of the hall.

The board lit up with the date and time, and Allen shouted, "What's the score?" The people snickered. The seventy-six pallets reappeared on the screen, and as they watched, green circles appeared around three of the beds. Allen stood, and the silhouette in one of the cots with the circle vanished. In place of the human figure, a yellow number 3 appeared.

Two green circled silhouettes remained. By counting from the bed he had just vacated, Allen was able to determine where the remaining green circled beds were. Two rows over and one bed down, Allen came upon Franklyn.

"Get away from me and stay away," Franklyn grumbled.

Allen shrugged and went to the remaining green circled cot. Curtiss was ready. He sprang to his feet and stretched. The little human figure in his pallet on the screen winked out and then a yellow number 3 appeared in its place.

"What's the matter with Candy Man?" Curtiss said.

Allen looked at his friend and laughed. "You're just asking that question now?"

Curtiss said, "We have to go, we want to find out what's going on, right?"

"Yeah," Allen replied. "Trojan Horse."

"Let's see if someone else wants to come in his place."

Raisin Face scrabbled off her cot and joined the two men. "Me," she said.

Franklyn refused to cooperate. Allen pleaded with him to change places with Raisin Face, but he refused to budge. Finally, the old lady came to him and raised her cane, and Franklyn responded. He moved to Raisin Face's cot and sat on the edge. A silhouette reappeared in her cot, and now all three green circled cots were empty, with a yellow 3 across each. The number 3 door clicked, and Curtiss walked slowly to it. It swung open at his touch. Allen and Raisin Face hobbled to join him.

They stood at the door and looked back.

"Doesn't Frank want to find his sister?" Curtiss said.

"Maybe he will," Allen sounded strangely unhappy. "He has to do things his own way, that's all. Irene will find him, or he'll find her . . ." Allen tried to sound confident but he knew he was not succeeding. Before them stretched the long coldly-lit corridor.

"Good luck," someone called from the group that remained be-

hind. In that moment, the people from Pigeon City were closer than ever before.

The trio nodded and waved, stepped into the corridor and the door swung shut behind them.

On the board, the three green circled beds winked out.

The screen cleared again and a film began. A white man beamed at the people. "Congratulations!" he shouted, and someone said, "It's that man from the Miss America."

"This group has been tested, and I believe there are now . . ." The screen went blank and the computer flashed a huge number 73. The film immediately resumed: ". . . of you. Is that correct?" The happy announcer paused and looked directly and earnestly into the camera.

"Yes, that's right," someone called, and the glad-face man went on talking:

"It has been determined by our computers that you are best suited for . . ." The film stopped again and the computer lit up the board with the words "Agriculture, Farming."

"Now," the announcer laid aside the sheaf of papers he had been holding. "Are there any among you (and please, don't be afraid) that do not wish to go?" He made the question sound more like a statement, and the people looked nervously at each other as his face slowly faded from the screen and the film ended.

The now familiar pattern of pallets with their little silhouettes reappeared on the scoreboard. Franklyn was certain that wherever his sister might be, Irene would not be likely to agree to go to a farm. He took a deep breath and got to his feet.

His silhouette winked out and an ugly red X began to appear across the vacated pallet. A yellow number 2 formed when the X was completed.

The hall was still. Franklyn wet his lips and began walking toward the door. It swung open at his touch and he stepped in without once looking back. When the door had swung shut behind him, he could hear the happy announcer voice resuming, and the occasional self-conscious cough of the others as they watched. The booming friendly voice grew fainter as Frank went down number 2 corridor. He could hear it stop one or two times, and he knew the computer was printing out special instructions.

He knew his sister would not go to a farm. She would have to be crazy to go along with that idea.

"Not Irene," he muttered to himself.

It occurred to him that he had never seen a white person except on eduvision, and he wondered what he would find at the end of hall number 2. He began to wish he had gone with Allen and the others.

"Do you think we did the right thing?" Curtiss said slowly. They were sitting in an anteroom at the end of number 3 corridor.

"This is a strange time to ask," Raisin Face scolded.

Curtiss watched Allen limp to the door and try it for the fourth time. It was still locked. On the other side they could hear what sounded like lots of office machinery. They had been able to go no farther, and now they were trying to be patient. Allen hobbled back and forth, and Curtiss stared at his hands.

The door opened, and a tall, beautiful black woman stood on the other side. Curtiss stared wide-eyed. She wore makeup and jewelry. Bracelets jangled on her arm as she greeted and motioned them in.

"Hello, come on," she laughed.

"Where'd you get those?" Curtiss said, staring at her bracelets as though the woman did not exist.

The tall lady laughed and said, "There'll be time for that later. Right now, there is someone that's waiting to meet you."

The group got to their feet and followed the statuesque woman through the door. She was the first person any of them could recall seeing, face to face, outside of Pigeon City. Allen glowered at her, full of hate and mistrust, but he limped along with the others. The machines they had heard on the other side of the door turned out to be teletypes. The room was full of them, and the floor seemed to vibrate with electric energy.

Capable and serious black men worked among the machines. They wore white coveralls. "Watch your step," their guide called as they

picked their way through the machines.

"We're installing new equipment," she explained. The new arrivals nodded and moved along. This was the first time they had seen men working with machines. Allen would not relax.

"Where are you taking us?" he demanded.

"You'll see," the beautiful woman answered. She smiled radiantly. Allen grumbled, and she smiled even more.

"What's your name?" Curtiss asked.

"Oh, I'm sorry," she said. "I'm Carol."

Allen shot Curtiss a furious look, but Curt ignored him. They passed from the teletype room to a long hall, and Carol stopped before a series of elevators.

Their car stopped at the seventeenth level, and the group stepped into a large sunny office. Behind a tremendous desk sat Irene. She was looking through some papers, and when Allen, Curtiss and Raisin Face stepped into the office, she rose to greet them. The elevator doors closed behind them and Carol was gone.

"Irene!" Allen cried.

"You aren't really surprised are you?" she said and they all laughed.

"We're happy to see you," Raisin Face said. "Your brother is here somewhere, and he is looking for you."

"I know," Irene replied.

"You do?" Curtiss walked toward her desk.

For an answer, Irene handed Curtiss a computer printout. On it were listed the names of the reclaimed people from 112th Street. Allen looked impatiently over Curt's shoulder. They saw that their names were circled in green, along with Franklyn's.

"I hoped he would come with you," Irene said softly.

"Well, he didn't. He's as stubborn as he ever was."

"I know he didn't go to the farm," she sighed.

"The what?" Allen's face twisted and he snatched the printout from Curtiss.

"The farm," she said. "I know he didn't go through number 1 door, because I have a list of those names." She put her hand on a pile of papers. "He must be in number 2, but we're still waiting for word."

"What are you talking about?" Allen put his hands on her shoulders and shook her gently. "What are you doing here anyway?" Allen's eyes narrowed and he suddenly dropped his hands and stepped back. He looked at Irene coldly, and he would say no more.

"Oh, no," she said quickly. "Allen, Curtiss, you know me. You can trust me." She looked at Raisin Face but the old woman would not meet her eye.

"I would find Frank and help him, but I have no real power here. I dispense information, that's all. I . . . I

indoctrinate." She looked at the group anxiously, but no one made a sound.

At last Curtiss said slowly, "Irene, where is your brother? Why does he need help?"

"We know he went into tunnel number 2, because number 3 is the one you came through, and you came through without him. We test arrivals, and the ones they call 'Creatives' are green-lined and sent here."

Allen was slowly shaking his head. Irene continued:

"Number 1 tunnel is for the workers. They go to factories, farms and the like, and eventually they are recycled, distributed among compatible communities." She took a breath and looked thirstily at her old friends. They stared at her simply.

"What about number 2?" Raisin Face prodded.

"Number 2 is something else again," she replied cryptically.

Allen exploded. "We know that!" he shouted. "What happened to your brother?"

Irene's lip trembled. "Allen, I . . . please, Allen, won't you trust me?" She looked at them but their faces were hard. She seemed to shrug, and drawing on some inner strength, she pulled herself together before going on: "All I know for sure," she said, "is the number 2 corridor is a sort of obstacle course, and the number 2 area is a correction facility. The idea is, the people in 2 finish there and then go on to 3 or 1. Anything is possible, but I've never known anyone here in 3 to admit to a number 2 history." She turned and walked to the window. "I was going to intervene when I learned what had happened with Frank and Raisin Face but . . ." She stopped talking and stood alone and small with her back to them. Her shoulders shook. Curtiss almost felt sorry for her, but he would not try to comfort her.

"You were going to intervene?" Raisin Face said.

"Yes," Irene replied. "But we only knew he went into number 2; you see, he never came out."

Franklyn was alone and scared. He knew he was supposed to go straight down the corridor and into the arms of what? Something that put red *X*'s on beds? If the computer thought he would do that, then it had another think coming. Franklyn decided to go back.

He stood and listened at the door he had come through earlier, but he heard nothing on the other side. He tried to open the door, but it was sealed. He sat down and waited. He was hungry, but he would not eat. There were only a few pieces of candy left and he was determined to save them.

At last he heard voices at the other end of the corridor. They were coming for him! There was a metal ladder on the wall, and an air-conditioning vent. Franklyn scrambled up the ladder and swung the grate open. When the search party reached his

end of the corridor, Franklyn lay behind the vent, watching them. They were black like him, but he did not find that reassuring. They were somehow different, as though they had a purpose. He waited and watched, not daring to breathe.

At last the strangers seemed satisfied, and Franklyn crawled away through the duct. By the time they exhausted every other possibility and came through the duct after him, he planned to be deep in another part of the building.

He scrabbled on his hands and knees for what seemed like hours. He had never been so tired in his life. His pants were torn, and only his fear of falling into unknown hands kept him going.

At last he felt he would go crazy if he had to crawl another inch. He wanted desperately to stand up. In the narrow conduit, he could barely move on his knees and hands without scraping his back. He began to look for a way out.

There were many openings, but most were in heavily traveled areas, or offices. It was becoming increasingly difficult to move quietly. A woman walked by a grate almost directly under his nose. She smelled good. Franklyn sniffed, judged, and concluded that her scent was like flowers. He closed his eyes and sighed. When he opened them, the woman had stopped, and she was looking directly through the grate at him!

Their eyes seemed to lock, and then she turned and moved on as though she had never seen him. Franklyn waited until she was out of sight, and then, with his heart pounding, he swung open the grate and emerged. If that woman had seen him, why had she gone on? To get help? Of course! He had to get out of there!

Franklyn ran. He didn't know which way he was going or from which direction he had come. All he knew was that he was running.

A man with a white jacket stepped out in front of him.

"Hey!" he yelled, startled. But Franklyn spun and raced off in a new direction.

"Hey, Franklyn!" the stranger called.

"So they know my name!" Franklyn thought, and he ran even harder.

"Your sister is looking for you!" they called.

Franklyn laughed. "They won't get me to believe that," he panted. It seemed strange to him that no one was chasing him. He didn't know where he was going, so how could they? He could not shake the feeling that he was running into some sort of trap.

Irene led Curtiss, Allen and Raisin Face from her office and together they walked down the carpeted hall. Her step was quick and efficient; and her skirt went "flit, flit, flit" as she walked. Her head was high, a smile danced in the air around her.

"Damn," Allen said softly to Cur-

tiss. "She acts like she's about to whistle."

Curtiss nodded sadly. "Hey Irene," he called. "What are you so glad about?"

"I'm just glad you're here," she said sunnily.

"Glad we're here?" Raisin Face shook her head.

The little group moved on. At last they arrived at two huge double doors. Irene turned and halted. The rest of them came to a stop beside her.

"Yes, I'm glad," she said sincerely. "I've been through this many times before, and it's always the same. At first everyone is suspicious. After you see what we have to show you in here," she paused and tapped the door confidently, "things will be different."

"Irene, you can't even find your own brother . . ." Curtiss stopped himself but it was too late. Irene's lip trembled and her eyes shone. Raisin Face looked down at the carpet.

Allen intervened. "You know what he's trying to say, Irene. You want us to trust you, but you seem to have changed a hundred percent. You never dressed like this before. None of us did. You wear jewelry and makeup. You act so breezy and carefree. You seem to have forgotten everything. I would have expected you to be on our side no matter what. You're in a position to work with us, and help us, but instead you . . ." Allen choked and faltered.

"You expect us to trust you," Raisin Face said unhappily.

Irene's hand slid from the door and dropped to her side. "I'm sorry you think I work for Whitey," she said. "Fortunately, I'm able to prove how wrong you are. Unfortunately, it's you people that have done the forgetting. I've always been on the same side. It's too bad that you have to act so typical." She turned and looked squarely at Allen. "How could you forget?" she said wearily.

Allen hung his head and did not answer.

"People change, Irene," Curtiss mumbled.

"How right you are!" she replied. Then Irene swung open the doors.

The library was easily the most impressive thing they had seen since their arrival. Big, plush, and overflowing with the latest equipment and concepts, it took their breath away by virtue of its size alone. It seemed to be a city block wide by a city block long. Curtiss was the first to step in, and his feet sank into very thick carpeting. The floor sloped down at a gentle angle. Away on the far side of the room hung a huge eduvision screen.

The big board flashed status and data reports, new arrivals, numbers assigned or requested. Most of the figures and information meant nothing to Curt. The room stretching out before the board was filled with comfortable-looking swivel chairs, clustered in seemingly random groups of seven or eight. They were

cubicles with low walls, but it was obvious that every chair on that sloping floor could be turned to face the great screen, now hanging winking and chattering, and for the most part ignored. There was an occasional earnest-looking black man or woman who would stop, look up at the board and jot down something, but almost every black, tan and yellow face was glued to one of the smaller, individual screens scattered around the room.

Curtiss became aware that Allen had stepped into the room, and the two of them hung just on the library side of the threshold, feeling conspicuous and clumsy. The walls were lined with multicolored rows and stacks of edutapes. They looked at each other, wanting to speak, but there was nothing to say.

They listened. Computers whirred quietly; it was a roomful of baby typewriters. They listened; pages flipped and paper rustled. The people in the cubicles were working with machines.

"This way, please," Irene said, walking briskly by them. Her voice was curiously deadened by the carpet, the walls, the very efficiency of that velvety atmosphere.

"Come on!" Raisin Face hissed as she caned her way in behind their guide.

"There is no need to whisper," Irene said airily. She seemed at home and unimpressed by the opulence that so overwhelmed the newcomers. Curtiss felt a twinge of envy; it was the same jealousy to which he had become accustomed those lonely summer mornings back on the roof with his pigeons.

He watched Irene as she selected a cubicle and offered them seats. "She's so confident," Curtiss thought to himself. He realized that Raisin Face had made a strong point when she said they were all behaving essentially the same way they always had. He looked at Allen, and saw that his friend was glaring at everyone and everything. He knew Allen was probably planning something at this very moment. And he recalled the way he himself had turned away from Irene in the hall and mumbled, "People change . . ."

"Do they?" he suddenly said aloud, and Irene glanced at him. He had lost a friend. Maybe she would understand, he had been frightened, the surroundings, so totally unfamiliar . . .

"Please sit down," Irene said officially. Raisin Face eagerly took a seat. Her chair went "poshhh," and she grinned gummily.

Irene left them in the cubicle. "I'll be right back," she said. Her voice had lost all of the former sunny, breezy sparkle. Curtiss hung his head in shame and the rest of the group folded their hands on the table.

Irene returned with three or four tapes. Taking a chair at the head of the table she said, "I want you to see these, you will find that they explain themselves." She sounded like an

eduvision announcer, and Curtiss wanted to weep.

A soft whistle sounded, and throughout the room, hundreds of chairs clicked as everyone turned to face the big board. The library assumed an auditorium aspect. Curtiss and the rest of his group followed suit. The screen went blank, paused, and flickered to life. It showed a hallway. It was narrow. The walls seemed to be metal. Thick yellow gas of the same type used in reclamation seethed and boiled along the floor of the corridor, evilly swirling. Allen and the others wrinkled their noses—remembering.

The camera seemed to be focusing on a shadowy figure somewhere in the gas. There was no sound; just the ever-clarifying image of what they now could see was a man. He was on a ladder. Clinging to a ladder and reaching for something over the rising mustard cloud of gas. His face, there was something about the panic in his eyes that wasn't exactly right. Something . . . concentration. This trapped man was not giving in. Terrified, but unbeaten . . .

Curtiss was the first to recognize Franklyn. He jumped to his feet and stared helplessly while the fugitive hung to the ladder and reached out toward what seemed to be an inverted brass flower in the middle of the ceiling. He reached and stretched. In his hand he held a lighted match. The flame was painfully small.

"What's he doing?" Curtiss cried.

"He's trying to set off the sprinkler system," Allen said softly from his chair.

The gas was rising. Franklyn turned to the camera, and he seemed to be shouting something. Suddenly, he released his perch and disappeared into the swirling, angry yellow clouds.

The screen went blank. There was a collective sigh throughout the room, and the board resumed its posting of information. The swivel chairs clicked again as people went back to their positions. Allen turned to Irene's chair. It was empty.

Curtiss was looking through the tapes Irene had left on the table. They were bundled together with an inch-wide plastistrip on which was printed: "Mass Reclamation." The individual reels were marked with neighborhoods. "Bedford Stuy" was one of the oldest; "Harlem" was the most recent.

"Let's see the Harlem tape," Raisin Face said when the bundle was passed to her.

"Do you know how to work these things?" Allen asked.

"I'll set them up for you." A voice had suddenly joined the group from behind. They whirled in their chairs, and Carol smiled a greeting, reaching for the tapes.

"Irene went to get her brother. He belongs in number 3 with us," she confided as their screen lit up with shots of last night's riot. There was Curtiss' smashed coop on the mechi-

engine. The street was filled with familiar faces. They saw again the looting and breaking, the fire, and then finally, the people, all but two of them, frozen with fear at random places, the arrival of the mechivans, and the voice of a white narrator chanting hypnotically off camera: "This is the fate of the greedy, the ignorant and the destructive." The tape ended.

"Whitey," Allen whispered, and Carol smiled.

"Don't blame Whitey," she said.

"Who are we supposed to blame? Ourselves?"

"No, Allen," Carol replied. "Why do you have to blame someone?"

"You aren't for real, are you?" Curtiss began, but Allen put his hand on Curt's arm.

"Don't even bother to answer her, man," he said.

Carol smiled patiently. "Around the turn of the century, in the cities, do you know how many jobs the old 30-hour-a-week system had provided?"

Allen glared at her as though she were crazy.

"But you do know there were more make-work projects than there were real jobs? And you do know the cities were falling apart? The people were turning on and blaming each other. Nothing would stop them. It was and is the way of Nature."

Allen had been shifting restlessly in his seat, but he could stand it no longer. "The way of Nature!" he shouted. "Why don't you cut this out and let us know what the hell is going on?" He pounded the table with his fist and the people in the cubicles around them stopped to watch with an amused sort of mild interest. Allen glared back at them.

"What are you supposed to be doing?" Allen said, and he suddenly reached across a cubicle wall, snatching a clipboard before his startled victim could react.

Allen began to leaf through the man's papers, and he was pleased to notice more and more people turning in their chairs to watch. He looked mischievously at Curt, and Curtiss was almost certain Allen's eyes sparkled with secret glee.

Carol nodded to the man from whom Allen had taken the board and he smiled wearily before turning around and resuming his work. Throughout the hall, everyone was going back to their projects. Allen stood, stunned and alone for a few seconds, and then he flopped to his chair still clutching the clipboard.

"Allen, please try to bear with us," Carol was saying.

"What is this place?" Allen muttered.

"Our library." Carol folded her arms and waited.

"What do you do here?" Allen looked up at her like a child.

"We receive tapes and store them, we annotate and dub them, and we write scripts for them."

Allen blinked and looked at Curtiss. Curtiss' eyes were wide.

"We know what approach is the

most effective, having the same backgrounds," Carol said almost patriotically.

"You witch," Allen whispered.

Carol continued. "If the people are satisfied to live in the ghetto, we let them. But the ones who aren't intimidated, who aren't satisfied to remain in their areas, who create some sort of disturbance--we bring them in and test them."

"Witch," Allen said a little louder, and his eyes were growing hot.

Carol broke off and looked at him calmly. "Fascinating how you must hate," she murmured appreciatively.

Allen rose in his chair and stared at her blindly.

"Would you like to see another tape?" Carol invited. She didn't wait for an answer. The small eduscreen was glowing again. Curtiss and Raisin Face watched. Allen pivoted stiffly and faced the screen.

There had been a disturbance of some sort. The camera showed a burned-out shell of a smoking building that seemed to have been a theater. A street sign showed the loca-

tion to be "Queens Boulevard and 71st Avenue." People stood around dumbly waiting for assemblance. There were the familiar mechivans; the doors stood ajar.

Curtiss shuddered involuntarily, and then he looked, rubbed his eyes and looked again. These people were white! He hadn't noticed at first, perhaps it was because he was almost conditioned to seeing white people on eduvision, perhaps it was because the pattern of the negative reinforcement tapes was such a familiar one, but there they were, white people. And they were being reclaimed! A narrator began to speak off camera. The voice of a black woman, and she was saying: "This is the fate of the greedy, the ignorant, the selfish . . ."

The tape ended. Curtiss sat stunned for a moment, and then he said, "That voice, that voice was familiar . . ." and he looked up toward the ceiling.

Carol laughed. "I always wanted to be an actress," she said as though confessing a nice secret.

"Where are the white people taken?" Raisin Face asked timidly.

Carol paused and moistened her lips. She obviously enjoyed her job as narrator and guide. "Separate but equal facilities, Long Island City," she announced. Her eyes sparkled proudly.

Allen stood, looking off into space. "Never," he murmured. "I'll never go along with any of it." His eyes were going vacant.

Curtiss looked anxiously to Carol. "Will he be all right?" he asked.

"Of course he'll be all right!" she snapped. "You, his best friend, should know it."

"I should?" Curtiss whispered.

Allen looked blankly from one to the other.

"You know how he is," Carol said patiently. "We had no idea he would blow up a block of buildings and start a riot, but we've been watching him for a long time. Here we have the facilities Allen and the creatives like him need."

Allen's eyebrows went up, but he said nothing.

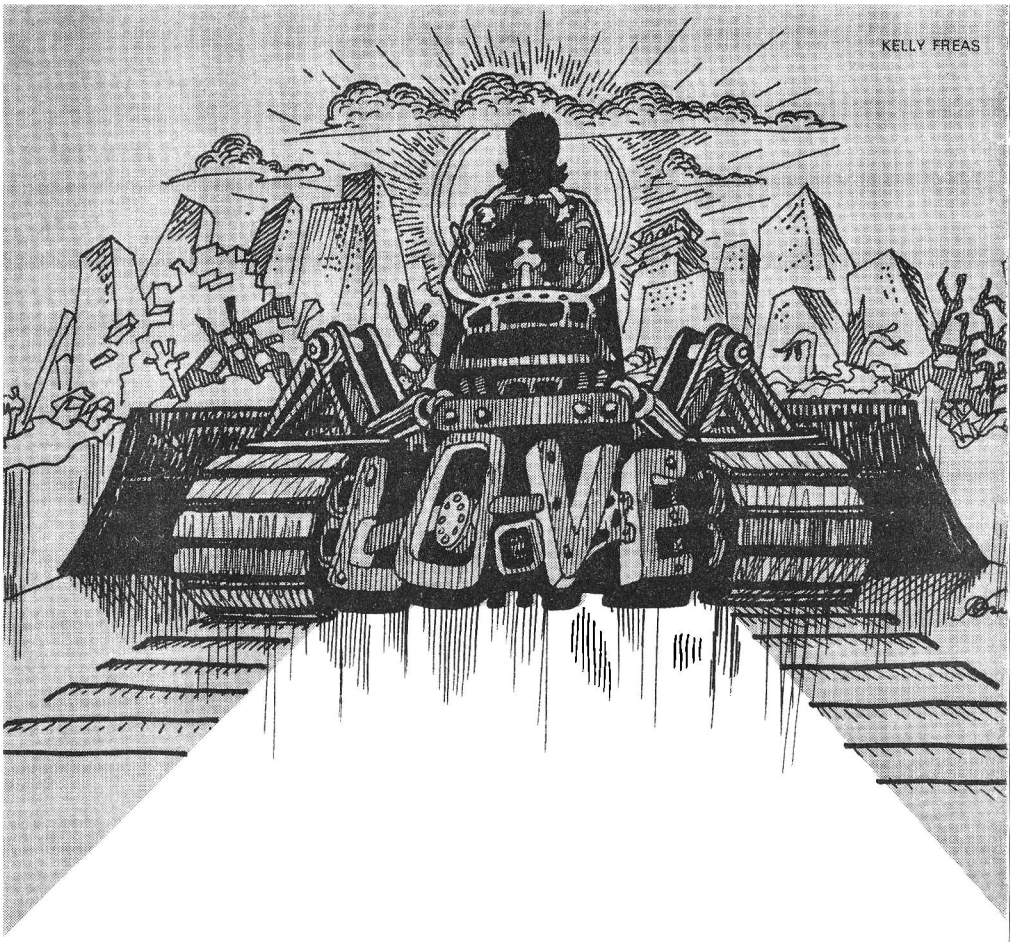
Carol watched him and smiled with satisfaction. "Yes," she went on. "Equipment, storerooms full of information, assistants, I could go on and on."

"I can do what I want?" Allen said suddenly.

"Sure you can," Carol replied. "You can even go back to your ghetto and try to liberate the people there, if you like. You would have to spend some time at the, what was it? The farm? But you can go back, or you can stay."

Allen looked undecided. Carol put her hands on his shoulders and looked steadily into his eyes. "We need you, Allen," she said. "We need your drive, your energy to help us run the city. You are a leader, and we want you. Will you stay and help?"

Curtiss wasn't sure, but he thought he saw Allen wink quickly before he replied. "Yes," he said at last. ■



ANTHONY R. LEWIS

REQUEST FOR PROPOSAL

The startling fact about Homo Bureaucratis is that
he lives in a paper universe called The System,
and the real world of human beings seldom enters his universe.

DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Chief, Improvements Branch, Readjustment Division
TO: Branch Members
DATE: 7 March 1984
SUBJECT: COST EFFECTIVE OPTIMIZATION OF INNER-CITY INTERACTION STABILIZATION

1. Reference is made to the President's speech of 1 March dealing with the necessity to solve the problems of inner city personnel and matériel interactions in a modern cost-effective manner utilizing state-of-the-art technology.

2. Reference is further made to the statement of the Secretary of Housing and Urban Development reaffirming the role of the Department in the solution of the substantive problems of our society and the need for additional funding in this area.

3. Reference is further made to the memo from the Center Director stressing the unique capability of this Center due to its history of university and industrial relations and its in-house facilities and staff.

4. In accordance with paragraphs 1-3, I would like all technical members of the branch to submit to me, by 14 March, their ideas as to how our branch can aid in the implementation of these national goals.

a. It is not intended that any of these suggestions will be in final form.
b. Include estimates as to costs and man-hours to be committed.
c. I would like to see new concepts: remember that the President has requested us to solve the problems—not their symptoms.

Invest in America
Buy United States Savings Bonds

DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Gordon Rogers
TO: Chief, Improvements Branch
DATE: 13 March 1984
SUBJECT: COST EFFECTIVE OPTIMIZATION OF INNER-CITY INTERACTION STABILIZATION (Branch Memo of 7 March 1984)

Keeping in mind paragraph 4c of your memo, the problem seems to naturally divide into the areas of matériel and personnel. However, the approach I suggest will be equally effective in both sections of the problem. (This will enable a saving in both procurement and administrative areas.)

The matériel problem is essentially the replacement of obsolescent and obsolete residential (and, to a

very small extent, industrial), buildings in a controlled economical method.

Some of the major problems to be expected are: labor union regulations; local construction ordinances; lack of specialized tools/techniques.

All these essentially add to the time required to perform the task, adding to the cost. The current patchwork method also makes it extremely difficult to perform long-range, large-scale planning for slum clearance and urban renewal.

The personnel problem is closely tied into this with older buildings (which provide too many defense positions) making effective law enforcement difficult. The unplanned city growth (especially in the use of narrow and short streets) hampers effective control of urban disturbances and riots.

The obvious solution to all these problems is the selective use of low-yield tactical nuclear devices as the major components of a modern, effective slum clearance and riot control program. It is expected that sufficient devices can be transferred from the Department of Defense, at cost, in the initial stages of the program. Further downstream, alternate sources for the devices can be sought on a competitive bid basis, thereby decreasing costs.

The program could be run by the Department directly or as a contractor to the states.

I estimate the first year's program should run about $4,700,000 and involve forty man-years of technical and support staff.

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DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
ROBERT F. KENNEDY RESEARCH CENTER

FROM: Chief, Improvements Branch
TO: Gordon Rogers
DATE: 19 March 1984
SUBJECT: Your Memo of 13 March 1984

Are you serious? You are proposing that we go into these areas and essentially eliminate them and their inhabitants without any warning. What you are proposing is administrative murder—these are living human beings. Perhaps you meant the whole thing as a joke; but, if so, it is in very bad taste. Regardless of how much money could be saved I don't think anyone in this Department (or any other) would justify using the methods you proposed. If you have any sane suggestions in line with my memo of 7 March, I would like to see them.

A copy of this memo is being placed in your permanent personnel file.

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Gordon Rogers
TO: Chief, Improvements Branch
DATE: 21 March 1984
SUBJECT: Your Memo of 19 March

My proposal was made quite seriously and I believe that its scope comes within the charter of this Center. I would like to refer you to the pertinent sections of the President's speech of 1 March (mention of some of these sections was made in the Division Memo of 7 March) calling for solutions to these critical national problems.

It was not my intention to have any solutions performed in secret, as this could lead to the loss of innocent life and a decrease in the high esteem in which this Department and Center are held by the general public. After an area is publicly selected for improvement, Emergency Urban Evacuation Notices can be served on all persons living in the area under the construction title of the Federal Urban Transit Act of 1977. This will give all decent law-abiding citizens in the improvement area no less than forty-eight (48) hours to relocate elsewhere. They would, of course, have first option to rent new housing (if any) in the improved area after improvement operations.

Since all people residing in the country have their addresses listed in the National Data System, Emergency Urban Evacuation Notices can be sent to all the inhabitants. I would also like to point out that since both failure to report changes of address and failure to comply with an Emergency Evacuation Notice are felonies, we have what is essentially a self-selecting system which will preserve law-abiding citizens and no others.

I hope that with these points made clear you will see fit to approve this suggestion and pass it on to the Division Chief for consideration. In any case I should point out that even if you do not approve this suggestion, since it deals with an issue designated as a "National Priority Issue" it must be forwarded as called for in the Civil Service Regulations (105.8) and the Internal Operation Instructions of the Department of Housing and Urban Development (RA25-3(c)).

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Chief, Improvements Branch
TO: Chief, Readjustment Division
DATE: 28 March 1984
SUBJECT: Proposed Program for COST EFFECTIVE OPTIMIZATION OF INNER-CITY INTERACTION STABILIZATION

This proposal is being forwarded to you as a "National Priority Issue" under section 105.8 of the Civil Service Regulations and Section RA25-3(c) of the Internal Operating Instructions of the Department of Housing and Urban Development.

This proposal has not been approved by the Branch Chief, Improvements Branch.

Although it should be obvious that this proposal is contraindicated on moral and humanitarian grounds alone, I have included a list of technical objections which should be sufficient grounds for rejection of this program.

Enc: technical objections, list

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Chief, Readjustment Division
TO: Gordon Rogers
DATE: 2 April 1984
SUBJECT: Proposed Program for COST EFFECTIVE OPTIMIZATION OF INNER-CITY INTERACTION STABILIZATION

The Division has received and reviewed your proposed program and has found the following problems involved. It is our opinion that any one of these would be sufficient to cause rejection of this program.

1. What percentage of the buildings in potential improvement areas are industrial? This is extremely important as it would lead to a lessening of the city's tax base.

2. What provisions will be made for the exacerbation of the housing shortage since the decrease in demand will not be concomitant with the temporary supply decrease? (Assuming proper action with regard to the Emergency Urban Evacuation Notices.)

3. What damages could occur in neighboring nonimprovement areas? How can we predict overlaps and errors? What tolerance in "slop-over" can be allowed in both personnel and matériel?

4. What containment is necessary under the terms of the Nuclear Test Ban Treaty?

5. What would be the added costs if it becomes necessary to prevent the dispersal of fallout? Or, of the reimbursement of affected areas, if this is more economical?

6. What specific problems will there be with labor unions? Will it be better to retrain the people involved or to pension them off?

7. In order to demonstrate cost effectiveness we will have to run a pilot program. Outline briefly, with especial reference to selection of areas and parameters, such a plan for effectiveness-result comparison.

If you cannot satisfy the problems listed above by 9 April 1984, I shall

have no choice but to reject your proposed program.

cc: Improvements Branch

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Gordon Rogers
TO: Chief, Readjustment Division
DATE: 9 April 1984
SUBJECT: Your Memo of 2 April 1984

1. Data from the 1980 census indicate that in potential improvement areas less than four percent of the structures (floor area) are classified as industrial. Of these, more than ninety percent are over sixty (60) years old and are considered to be inefficient.

2. The problems of temporary housing may be met as provided for under the Federal Transit Act of 1977. Those people who cannot relocate independently (through family, friends, or private agencies) are to be provided for by the Federal Government either in the Ecology Improvement Relocation Camps or as Urban Inductees (quasi-voluntary) in the Armed Forces or the Peace Corps.

3. With state-of-the-art techniques in nuclear devices, we can, by pattern shaping, reduce the error to less than twenty feet (approximately an average city street width). The greatest error will result from emplacement of the devices. If we can hand emplace, this will be eliminated. The accuracy of emplacement via remote delivery is estimated as twenty feet (ground) or fifty feet (air). (All uncertainties are root-mean-square.) Since the areas immediately adjacent may also be in need of improvements within a short time span—it is not expected that in most cases this will prove a problem.

In a few cases we may have just such a problem and then a choice arises between a decrease in the yields used, necessitating additional manual clearance at the peripheries, or the reimbursement of survivors and/or legatees in the surrounding areas in the case of nonoptimum emplacement. Which will be more economical will, of course, depend upon the details of each specific case. A small contract to a consulting firm to develop a choice algorithm would be in order here.

4. Semantically, this is not a test. I think we will still be abiding by the spirit of the treaty, since these events will not be directed against anyone, but will be of a specific corrective and constructive purpose. Recent urban developments in other countries lead me to believe that our successes in this program will be quickly imitated elsewhere. Possibly, later projects could be done on an international basis—with due regard to security.

5. It is not expected, in the majority of cases, that containment in advance will be practicable due to the possibility of criminal elements. Present device design indicates that major fallout components will be neutron-activated environmental artifacts. Calculations indicate that proper emplacement can eliminate up to seventy-six percent of the specific activity present twenty-four hours after the event. Reimbursements to the surrounding areas are covered under Title 7 of the Federal Urban Transit Act of 1977.

6. Studies of documents and speeches indicate that a lump-sum payment to the union(s) retirement fund plus assurance of employment on rebuilding projects in the improved areas will be adequate. Possibly a contract with the national unions involved would be desirable.

7. This will involve a pilot program. In order to gather necessary background data we should construct (probably at the Nevada test site) a selection of the different building styles which would be encountered in major cities in their potential improvement areas. These would then be staffed with personnel transferred from the Departments of Defense and Labor (proper backgrounds, et cetera, to be computer-selected). Costs for personnel would be on a per capita-per diem basis and would be extremely low under the Universal Conscription Act of 1979. If this phase is to be extended as data from cities are obtained, perhaps some of the personnel temporarily evacuated (see paragraph 2) would volunteer for this assignment knowing that it would aid in the improvement of the lives of their socioeconomic class.

These data will enable us to construct algorithms for the choice of cities as tests for this program and to eliminate effects due to the differing urban matrices in which the individual improvement areas are embedded.

I trust that this fully answers the questions you raised. I request that this proposed program be forwarded to the Center Director as a "National Priority Issue" under Section 105.8 of the Civil Service Regulations and Section RA25-3(c) of the Internal Operating Instructions of the Department of Housing and Urban Development and in accordance with the expressed desires of the President in his speech of 1 March 1984.

cc: Improvements Branch

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Chief, Readjustment Division
TO: Director, Robert F. Kennedy Research Center
DATE: 13 April 1984

SUBJECT: Proposed Program for COST EFFECTIVE OPTIMIZATION OF INNER-CITY INTERACTION STABILIZATION

1. Herein is forwarded a proposed program in the area of Cost Effective Optimization of Inner City Interaction Stabilization as a "National Priority Issue" under Section 105.8 of the Civil Service Regulations and Section RA25-3(c) of the Internal Operating Instructions of the Department of Housing and Urban Development and Center Directive XLR-2527-003.

2. This proposal is in response to the Center Memo of 7 March 1984.

3. This proposed program has not been approved by Chief, Improvements Branch nor Chief, Readjustment Division.

4. It is felt that this proposal is highly immoral and that it be rejected.

cc: Improvements Branch
Gordon Rogers

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DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
ROBERT F. KENNEDY RESEARCH CENTER

FROM: Director, Robert F. Kennedy Research Center
TO: Chief, Readjustment Division
DATE: 18 April 1984

SUBJECT: Proposed Program for COST EFFECTIVE OPTIMIZATION OF INNER-CITY INTERACTION STABILIZATION

1. In view of both the public statements of the President and the Secretary of Housing and Urban Development and the fact that this area has been designated a "National Priority Issue" I do not think that we can reject this proposal on any other grounds than deficiencies in the technical aspects.

2. The following major questions have not been answered by the proposed program document:

2.1 Control of devices to be used in this program is by AEC and/or Defense. Is it feasible to set up a liaison program to handle transfers of this magnitude?

2.2 How will the actions of the recalcitrant element in the potential improvement areas affect the proper emplacement of devices, bearing in mind that at least forty-eight hours' notification will be given?

2.3 In the construction of any selection algorithm, it is essential to include the factor that any population readjustments due to the program should not decrease the present Administration's representation in the Congress.

3. Please have Mr. Rogers report

to me with answers to the problems in paragraph 2 before 25 April 1984.

cc: Improvements Branch

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

19 April 1984

Dr. J. Moriarty (Code 21-5)
Defense Nuclear Agency
Washington, D.C. 20301

Dear Jim:

We've got a possible program going here in line with the President's speech of 1 March setting up the inner-city problems as a National Priority Issue. Before we can go ahead with formal requests for liaison I'd like to talk to you informally about it. Please give me a call on FTS or Autovon soonest.

Gordon Rogers

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

19 April 1984

Col. S. Moran (Code RM-37)
United States Atomic Energy Commission
Washington D.C. 20545

Dear Sebastian:

In regard to the President's speech of 1 March setting up the inner-city problems as a National Priority Issue, I think we've got a possible program here that would be a natural for cooperation between our two agencies and would be to all our advantages. Give me a call on FTS and we'll talk it over before we do anything formal about it.

Best to you and Irene.

Gordon Rogers

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Chief, Readjustment Division
TO: Director, Robert F. Kennedy Research Center
DATE: 25 April 1984
SUBJECT: Proposed Program for COST EFFECTIVE OPTIMIZATION OF INNER-CITY INTERACTION STABILIZATION (Your Memo of 18 April 1984)

Mr. Rogers has spoken informally to the appropriate persons in both the Defense Nuclear Agency and the

Atomic Energy Commission and we have been assured of the support of both agencies in fulfilling the pledges of the President in his raising of the inner-city problems to a "National Priority Issue." (See attachment A for confirmatory memos.)

See also attachment B giving details of remote emplacement in the event that access to the potential improvement area is denied to lawful authorities by recalcitrant elements.

See also attachment C spelling out the constraints to be placed on the selection algorithms as specified in paragraph 2.3 of your memo of 18 April 1984.

Since I see no possible way to prevent this program from being actualized in my present position, I wish to tender my resignation from the Department.

cc: Improvements Branch
Gordon Rogers
att: A—confirmatory memos from DNA, AEC
B—legal brief and details of remote emplacement
C—mathematical constraints on selection algorithm

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Director, Robert F. Kennedy Research Center
TO: Acting Chief, Readjustment Division
DATE: 3 May 1984
SUBJECT: COST EFFECTIVE OPTIMIZATION OF INNER-CITY INTERACTION STABILIZATION

This is to authorize you to proceed immediately with the subject program as defined in our previous communications. Below is a quote from the Secretary of Housing and Urban Development concerning this program:

> "This program will be in keeping with the finest traditions of our country and will reflect most favorably upon the Department and upon the Robert F. Kennedy Research Center and upon those individuals directly involved."

cc: Improvements Branch
Gordon Rogers

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DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
ROBERT F. KENNEDY
RESEARCH CENTER

FROM: Acting Chief, Improvements Branch
TO: Chief, Procurement Branch
DATE: 7 May 1984

SUBJECT: REQUEST FOR PROPOSAL

Procurement Request for Study for the Cost Effective Optimization of Inner-City Interaction Stabilization

1. It is requested that a contract be negotiated with a commercial source to perform the efforts described in the attached work statement and performance schedule, exhibit A.

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DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
ROBERT F. KENNEDY RESEARCH CENTER

Issue Date: 4 June 1984
Subject: Solicitation No. HUD84-2101R
Title: Cost Effective Optimization of Inner-City Interaction Stabilization
Due Date: 9 July 1984, 1700 (local Washington, D.C. time)
Submit to:
Negotiated Contracts
Procurement Branch
Department of Housing
and Urban Development

Gentlemen:

The U.S. Department of Housing and Urban Development, Robert F. Kennedy Research Center, solicits your organization for a proposal for a study aimed at defining the requirements for, and the economics of, the use of low-yield nuclear devices in the optimization of inner-city interaction stabilization.

This solicitation is covered by the following documents . . . ■

THE ANALYTICAL LABORATORY

AUGUST 1972

PLACE	TITLE	AUTHOR	POINTS
1.	The Pritcher Mass (Pt. 1)	*Gordon R. Dickson*	1.69
2.	Long Shot	*Vernor Vinge*	3.12
3.	Power to the People	*Wade Curtis*	3.50
4.	Nanda	*Gary Alan Ruse*	3.53
5.	Three-Tour Man	*Joseph Green*	3.87
6.	Budnip	*Jack Wodhams*	5.06

MISCOUNT

Nothing exceeds like excess . . .

C.·N. GLOECKNER

Memorandum to: Koranstan V.B.X.
From: Hdrxx Z.
Re: Salvage operations on Vitrix 4

The Cultural Encounter Office sent some representatives here yesterday afternoon, and they claim we've been picking up some Atomic Age artifacts on a satellite of a stage-one planet.

I don't need to tell you how serious this is. If they can prove we took something we shouldn't have, we could get slapped with a large fine and/or penalty on our trading license.

I hope to hear from you about this matter very soon.

Memorandum to: Hdrxx Z.
From: Koranstan V.B.X.
Re: Purported salvage operations on Vitrix 4

For the record, I want to say that neither I nor anyone in my department would step outside the bounds of law to pick up salvage on Vitrix 4.

We receive communiqués from C.E. quite regularly, and I understand from them that Vitrix 4 is a near satellite of a civilized culture with which we cannot come into contact for a few more centuries. Consequently, we have been giving the whole area wide berth on salvage expeditions.

Memorandum to: Farstokk Z.
From: Koranstan V.B.X.
Re: Purported salvage operations on Vitrix 4
cc: Hdrxx Z.

Apparently the company has become the target of one of the C.E.'s disorganized search-and-destroy efforts. They suggest that we have been carrying out salvage operations on Vitrix 4. Just thought I'd let you know in case you hear from them on this.

Memorandum to: Farstokk Z.
From: Koranstan V.B.X.
Re: Salvage operations on Vitrix 4

As you can probably guess from the attached memo, the old man is excited about this one. I guess those suits and that visual recording equipment we lifted from Vitrix 4 had better go back. Seems the C.E. boys think the natives might, on their next

little exploratory jaunt to the satellite, want to land where we salvaged the stuff. It might look pretty bad if something was missing that the previous landing team dumped.

Let me know if you have any trouble with the recovery.

Memorandum to: Koranstan V.B.X.
From: Farstokk Z.
Re: Vitrix 4 salvage

Sorry to tell you we can't recover the original suits or recording equipment. Outlet sold it to a big museum out on Farnn, and they refuse to give anything up. However, I did get permission to have facsimiles made, at forty xartm per.

Memorandum to: Farstokk Z.
From: Koranstan V.B.X.
Re: Vitrix salvage

Forty xartm! I see by your records that we barely made that much on the sale after operation expenses. All right, they've got us over a barrel. One thing—make a few extra suits while you're about it and I'll sell them to one of the circuses on Barx. That Vitrix alien is a real monster, judging by the shape of the suits. Seeing one of them is enough to make a person jump right out of his scales.

Memorandum to : Koranstan V.B.X.
From: Farstokk Z.
Re: Vitrix problem

All taken care of. I'm sending you the facsimile suits you asked for, and I'll dispatch a ship to replace the suits and equipment on Vitrix sometime this afternoon.

Memorandum to: Farstokk Z.
From: Koranstan V.B.X.
Re: Vitrix business

Just got your monthly financial report. What is this item: *seven* facsimile Atomic Age artifacts? You only sent me *four* suits. If you dropped *two* on the satellite to replace the ones we took, then what happened to the other suit?

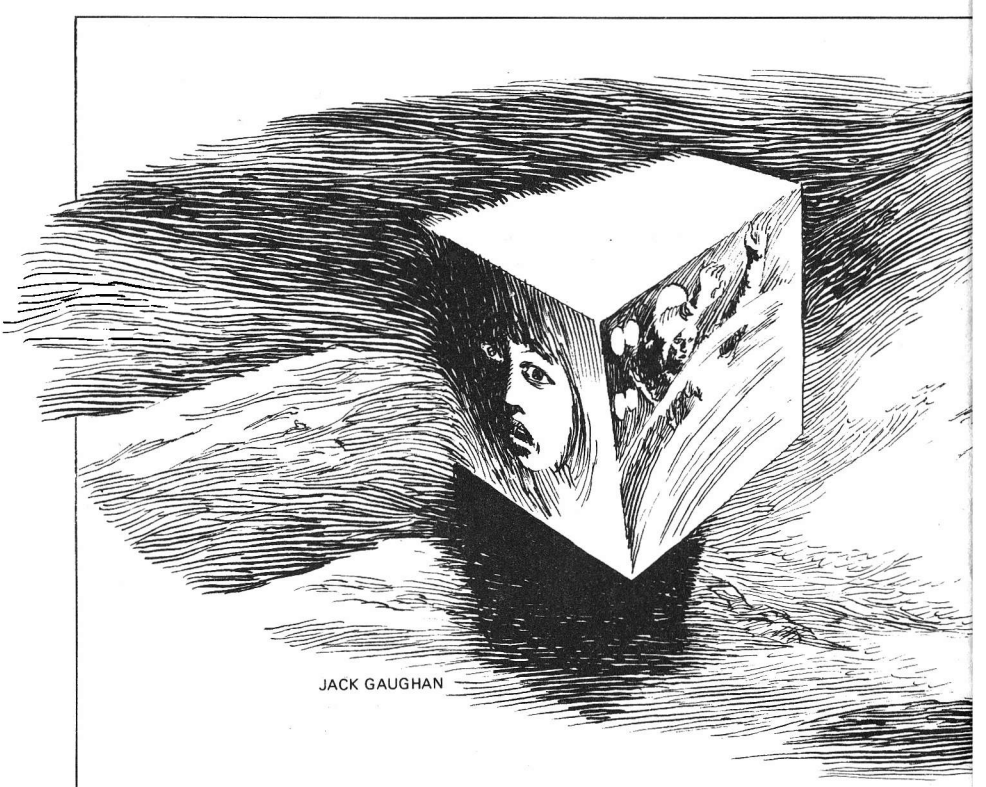
Memorandum to: Koranstan V.B.X.
From: Hdrxx Z.
Re: Possible C.E. suit arising from illegal salvage operations on Vitrix 4

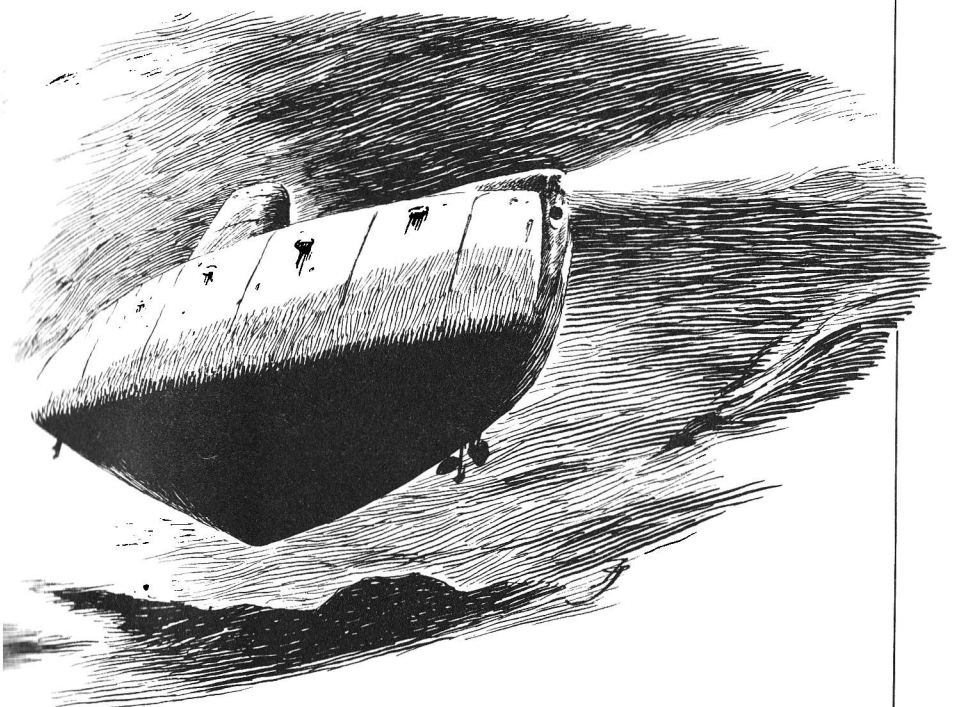
I hate to bring this up again, but I hear from friends in high places that we are about to get hit with a C.E. suit. Now, I believe you when you say we're blameless, but I'd feel a lot better if you came down here to represent the company's interests. I hear that the aliens did land again in the place where the C.E. believes we were carrying out illegal salvage operations. There was some kind of irregularity that caused a great deal of excitement among the aliens. The C.E. office seems quite upset about it, whatever it is.

I hope to see you soon.

Memorandum to: Koranstan V.B.X.
From: Farstokk Z.
Re: Item from last monthly report

You mean there were only *two* suits on the Vitrix 4 site in the first place? ■


JACK GAUGHAN



Electronic recording systems produce data. F.O.D.
It takes a human mind to turn data into information.

JIM DURHAM

The visiphone chimed once, softly, then said, "Colonel Wall calling, sir." David Regis dropped *Wild West* into a drawer, picked up last month's *Undersea Technology,* and said, "It's Woell, Sandra. Wo-ell, not Wall. Put him on."

"Yes, sir. Colonel Wall," corrected the phone. The calm, dark features of J. Patterson Woell formed on the screen. "Hello, Regis. Why can't your phone pronounce my name?"

"Morning, Colonel," returned David. "Her discrimination circuits don't believe you." He patted the phone's memory unit. "Sandra thinks *you* don't know how to pronounce it."

"We built that model, didn't we?" said the colonel. David nodded. "Probably a stray piece of wire in there." David Regis, head of Quality Control of Transport Systems (Marine Division), winced.

"That was pretty pointed," he said. "Have we lost another one?"

The image in the phone clenched its jaws. "Yes," it answered. "The *Cousteau.* She was due this morning in Galveston, and a Navy plane heard her damage beacon not an hour ago. The Cruise Data Recorder was floating over the Puerto Rico Trench. I have already sent the *Cavalry,* with D.S.R.V.'s and bloodhounds. A Navy D.S.R.V. will be airdropped within the hour. Regis, if this turns out to be another Foreign Object case . . ."

David Regis slumped in his chair, hands over his eyes, shaking his head slowly. He looked up at the implied threat, his face almost blank, and stared at the man on the screen.

"I'm sorry, David," said Colonel Woell after a moment. "Captain Wilkins was a friend of yours, wasn't he?"

"That's right." Abruptly David turned away from the screen and gazed out his window at the sea above him.

"I'll tell Jennie," he muttered.

"What?" asked the image.

"I'll tell his wife," David repeated. He turned back to face the phone. "Let me know when it's certain, and I'll tell her."

"All right. And I'll want the Cause of Damage Report as soon as possible. Senator Willis will be on my neck again, as soon as he hears about this." The visiphone screen went blank.

David Regis turned back to the window. It was set directly into the pressure dome, seventy feet above the seabed level, and twenty feet above the great, steeply sloping skirt of plastic that sealed the city against the ocean. Although the dome was fifteen feet thick, a highly efficient plug of fiber optics transmitted the scene outside the window so faithfully that only inches appeared to separate the ocean and the man. The water was greenish, fading abruptly to a thick, impenetrable black that seemed to resent the city's lighted presence.

David could see a line of beacons, their beams slanted away from the

city of Velikovsky, two miles deep in the Antarctic Ocean. A tiny two-man prospecting sub moved rapidly out along the line on its way to a claim area. It seemed an impossibly frail thing to be challenging the blackness.

As he watched, a viperfish drifted past his window, the feeble glow from its row of body lights washed out by the city's luminance. Its stomach was distended by another fish whose tail still feebly flapped from the viper's jaws. David shook himself, and turned back to the desk.

"Sandra, show me the Cause of Damage files on the *Scott Carpenter,* the *SeaStar* and the *Woods Hole,*" he said. "Put them on the desk screen."

"Yes, sir," said the phone, and the top of the desk, which was tilted toward him like a drafting table, displayed three file covers.

David Regis touched a contact at the desk's edge, and the covers were replaced by print. He began reading. Now and then he circled statements with a light-pen, touched a contact marked "Correlation" on his desk top, and watched the circled statements appear together on a fourth page.

After a while, he yawned and rubbed his eyes. "O.K., Sandra, that's it for today," he said. "File it, and give me a print of the correlations."

"Yes, sir," murmured the phone, as several sheets of paper emerged from a slot below the screen. David Regis picked up the papers, slipped them into a folder, and put the folder into a dull green briefcase.

"Good night, Sandra." He walked out the door. "Lock it up."

"Yes, sir. Good night, sir," responded the phone. The door closed and the lights turned themselves slowly out behind him.

Later in the evening, David found himself standing at a door across the Dome from his office, holding a bottle of peach brandy in one hand and a spray of violets in the other. He touched the contact patch with his elbow and waited.

The door was opened by a girl whose vivid red hair was accentuated by the milk-and-cherries whiteness of her skin. Peggy Hanson's skin was touched only infrequently by the sun, and then only through a thick layer of ultraviolet-reflecting creams. The "untanned" look currently in vogue among the topside women was easy for Peggy, and superb on her as well. "Come in, David," she said. "You're late, and supper will suffer for it."

"I'm sorry, Peg," he said, "but—"

"No, no," she interrupted, "I know you had a good reason, and it doesn't matter anyway. No business tonight, huh?" She looked at him, and could see the tiny strain lines around his mouth. She kissed him gently. "At least wait till after supper."

"All right," he agreed. "No work until you've fed me." He handed her

the small bouquet of fresh violets.

She buried her face deeply in the blossoms. "Oh-h-h!" she sighed. "How can anything so tiny hold so much fragrance?" She pulled David into the kitchen, where she found a small flat vase to put the flowers in. She set the vase in the middle of the dining table. "There!" she approved. "A fitting complement to my sweet-and-sour pork—which we'd better eat now, before the rice gets clumpy."

After supper, David Regis laid out the facts on the table. "Four ships in two months! First, the *SeaStar,*" he said, placing his iced-tea spoon in front of him. "Lost with all personnel in the Mariana Trench. No wreckage found, but Cruise Data Recorder recovered. Cause of damage, catastrophic pressure build-up in the sodium-cycle heat exchanger." He tapped the fork against the table. "Apparently, something blocked the bypass valve. The explosion could've split the hull in half."

"And Transsystems gets the blame," said the red-haired girl across the table.

"We put the ship together, Peggy. We didn't build the heat exchanger, but we put it in and charged it, and there shouldn't have been anything in there to block the valve." He leaned back in his chair and sipped his tea. "Peggy, you wouldn't believe the trouble we go to, just to make sure some clown of an assembler can't make a mistake like that. We have industrial psychologists who do nothing but design assembly and inspection techniques for Quality Control. Those guys are *good,* too." He shook his head.

"What plugged the valve?" asked the girl.

"We don't know for sure, but there's a certain lockbolt used in the mating assembly that fits the valve orifice perfectly. If one of those got into the exchanger tubing some way, it would have plugged the valve eventually."

"Can you be sure it won't happen again?"

"I still don't know how it could have happened the first time. The exchanger coils are checked for free flow just before assembly, and neutrafluxed afterward. But we went back and rechecked the entire heat exchanger on all of those subs. Didn't find a thing, of course."

"Then the next one didn't have the same kind of failure?"

"No," said David, reaching for a knife. "The *Carpenter,*" he said, placing it alongside the fork. "This was one of the first cargo subs built. She had logged better than a million and a half miles, and you'd think any built-in trouble would show up in that time. We picked up the Cruise Data Recorder about eight hundred miles south of the Aleutians, but never found the ship."

"Don't the ships carry some sort of beacon?"

"Yes, but it's only useful for ranges less than ten miles or so, underwater. Even then, the transponder

could be buried in the mud. You almost have to know where the wreck is, first." He pursed his lips. "We'd never know which *ocean* the ship was in if the Cruise Data Recorder didn't detach itself and float to the surface."

"What happened to the *Carpenter*?"

"Electrical failure of some kind," David answered. "The C.D.R. recorded a massive overload in the Central Blanking Unit. Signals intended for some systems were received and acted on by other systems. Apparently it went crazy and dived into the bottom. You'd call it myasthenia gravis in a human." He sipped thoughtfully at his tea. "The only way we could simulate the failure in the lab was to toss a wrench into the works—literally! Circuits fully fifteen centimeters apart had to be shorted simultaneously."

"How could such a thing have happened?" Peggy wondered.

"Well, it wouldn't be easy," David replied. "First, the technician who performed the last check-out would have had to ignore at least five tool-handling rules just to get *near* the board with a loose tool of the right size. Second, he would've had to pick just the right tool—flat, no more than five inches long, with a slight bend at one end. Third, he would have had to be blind to miss the tool on his final inspection before sealing the board up."

"Could it have been intentional?" asked Peggy.

David sighed. "We narcohypnotized everyone who had access to the unit. If one of them did it, he didn't know about it. Yet . . . yet the C.B.U. was shorted by *something*."

"The next was the *Woods Hole*, wasn't it?" Peggy recited the incident. "The crew's survivors sued Transsystems for, uh . . . 'gross negligence in installation and design'. Something about a blocked air-supply pipe."

"That's right," said David. "The C.D.R. showed sudden lethal levels of carbon monoxide. The crew wouldn't have lasted more than two minutes. The sub finally ran aground somewhere in a deep off New Zealand, and released the C.D.R. There was some speculation that the C.D.R. may have been released before the sub finally stopped, because we never found a trace of her, either."

The girl shuddered. "How horrible! Could the crew tell what was happening?"

"Not really," said David. "They'd just suddenly be very sleepy. In fact, about a minute after the CO_2 flooding began, the sub's intercom carried the captain's voice, saying, 'So sleepy!' "

"Isn't there an alarm system on the sub for things like that?"

"Yes, but apparently it didn't operate. We couldn't find any reason for that, but we did simulate the CO_2 flooding by dropping a bottle cap into the air-regeneration tubing. It

blocked a CO_2-scrubbing loop, causing the scrubber to dump its accumulated waste into the airstream."

"A bottle cap!" echoed the girl.

"Yep. Completely, painfully typical Foreign Object Damage. That *really* set my neck against the chopping block. And now," he carefully picked up a knife and placed it beside the other three, "and now the *Cousteau*." He beat gently on the table with his fist.

"Do . . . do they know about the crew yet?" asked Peggy hesitantly.

"No sign of them," replied David. "But then, there never is." Sorrow etched his face. "I had to tell the captain's widow this afternoon—that's why I was a little late. And I couldn't even tell her what had happened . . ."

The visiphone chimed. "Your visitors are here, sir. Senator William Willis, Dr. Raymond Fisher, and Mr. Michael Roper."

"O.K., let them in, Sandra," said David, rising. He walked to the door. "Come in, gentlemen. Hello, Senator."

"Good morning, Mr. Regis," replied the senator. He was an older man, with wisps of white hair clinging to his shiny scalp. He entered the door, limping slightly, and turned to introduce his companions. "This is Dr. Fisher, our consulting physicist." The tall man with the alert, penetrating gaze shook hands with David. "And this is Mr. Roper, my staff assistant." The third man was short, with a thin mouth, cold eyes, and a limp handshake. David motioned them to chairs and returned to his desk.

"I understand from Colonel Woell that you are here on an informal fact-finding tour concerning the lost cargo subs."

"Yes," nodded Senator Willis. "We want to get to the bottom of this rash of accidents."

"There are several apparent, uh . . . discrepancies in the entire picture," put in Mr. Roper. "We want clarification of these items, plus some idea of the overall probabilities involved in this type of incident." He consulted his notes for a moment. "We wonder, for instance, if your assembly and inspection methods are up to standards."

"Also, Mr. Regis," interrupted Dr. Fisher, "I'd like to know just how reliable your data-recording techniques are. The probabilities involved in the accidents seem so small as to be, well, unbelievable. I'm wondering if your recorders are presenting unambiguous fact."

"I think we can satisfy you on that point," said David. "Something certainly happened; the subs are lost, and F.O.D. appears to be the culprit in the three previous cases. We don't know about the *Cousteau* yet, of course."

"F.O.D.?" said Dr. Fisher.

"Foreign Object Damage," explained David. "While you're here, I want to show you the lengths to which we go to prevent this sort of

thing. I think you'll agree that we have done everything possible."

"Frankly, Mr. Regis, we believe that Transsystems in general, and your Quality Control Division in particular, is guilty of gross negligence in the construction of those subs," announced the senator.

"I am aware of that, Senator, and I'm going to try to persuade you that your belief is incorrect," returned David.

The senator smiled thinly. "Certainly," he replied, "and that is precisely what Roper and Fisher are here to prevent—or rather," he amended, catching sight of Dr. Fisher's frown, "to assure that you present your case, uh, fairly. You are in trouble already, Mr. Regis, and if Quality Control is responsible for the loss of the *Cousteau*, we will have your hide."

David looked straight at the senator. "If Quality Control is responsible, sir, I'll give you my hide willingly." The senator looked up somewhat surprised. "One of my best friends was the captain of the *Cousteau*," David said, his voice flat.

The visiphone chimed almost inaudibly and a message appeared on the screen. David glanced at it, then looked at the watch on his wrist.

"The sub carrying the Cruise Data Recorder from the *Cousteau* just arrived, and the data will be processed in an hour or so, Senator. In the meantime, let me give you a general idea of the C.D.R. and the way we use it."

"We aren't here to be overwhelmed by technical details, Mr. Regis," said Senator Willis. "Let's not spend too much time on these things."

David suppressed an impulse to grab the old man and shake him. "As Dr. Fisher pointed out earlier, Senator, the C.D.R. is of prime importance to your investigations. The truth of a piece of data—the information content—depends entirely on the characteristics of the systems that gathered and stored the data. You have to be familiar with the C.D.R. to understand the limitations of the information it gives us."

"Limitations?" said Mr. Roper. "Are you going to tell us, sir, that the Cruise Recorder is, uh . . . unreliable?"

"Not at all," answered David. "I am trying to point out that there is a difference between the data provided by the C.D.R. and the inferences we make from the data. The C.D.R. tells us, for instance, that the pressure behind such-and-such valve at a particular time was, say a hundred and fifty pounds per square inch. It does *not* tell us that a #7 mounting screw plugged the valve and caused the line to fail."

"Quibbles," snorted the senator. "Are you trying to claim that you aren't responsible for the loss of those ships?"

David stared at the man, and a muscle jumped in his jaw.

"Senator Willis," he said quietly,

"you and these other gentlemen came here to 'get the facts' behind the loss of these ships. I am doing my best to acquaint you with those facts, and to show you where fact ends and inference begins. It is an imprudent man who will jump from molecular arrangements in a crystal to public statements concerning culpability in a shipping disaster, without knowing the territory he jumps over."

"Oh, very well," said the senator, tartly brushing David's words aside. "Let's get on with it."

"Sandra, let's have the C.D.R. briefing file on the wall screen," said David. While he turned to find a pointer in his desk, a section of blackboard slid aside, the lights dimmed, and an overhead projector threw a picture of a small greenish cubic crystal on the screen.

"This is the heart of the Cruise Data Recorder," said David, "a dimensionally stable, precisely machined block of tellurium II. In its initial state, it is an amorphous, noncrystalline solid, much like glass. In this state, the tellurium atoms are not bound to particular lattice sites and are scattered at random throughout the block."

He squeezed the pointer slightly, and a new slide, showing a random arrangement of atoms, appeared on the screen. "The block will revert to a crystalline state after a period of years, if left to itself. However, we help it along by impressing a crystal state on it in a controlled fashion." He squeezed the pointer again. "Here's a cube in the recording module. It's contacted on three mutually perpendicular faces by arrays of diode lasers, which are fired into the cube in groups of three. The interference pattern set up by the three beams arranges the atoms at the beam juncture, and promotes local crystallization. The interference pattern, which contains the information to be recorded, is 'frozen' into the cube, and may be read out later."

"Can you erase the crystals and reuse them?" asked Mr. Roper. Dr. Fisher snorted softly with amusement and was answered by a glare.

"No," replied David. "The crystals can be destroyed, of course, but not erased short of that. The cube provides a permanent, unimpeachable record."

"How about information capacity?" asked Dr. Fisher.

"We can record about a hundred billion bits of information on one of these one-centimeter cubes, with an information density about one percent of the maximum realizable density. By leaving lots of room, so to speak, around each bit of information, we obtain an excellent signal-to-noise ratio, plus room for parity checks, clock bits, and indexing." He squeezed the pointer, to display a schematic of the information flow to the cube.

"The cube records data from every major system on board. Some of the systems, such as the pile activity, are monitored constantly. Others, like

the inertial compass, are time-shared on a rotating basis with ten, fifty, or a hundred other sensors. Information flow to the crystal is determined by the Central Processing Computer, which quizzes the sensors in the proper order and relays the data to the beam coder."

"How long will it take to sort through the *Cousteau*'s data and find the cause of the accident?" asked Mr. Roper.

"About an hour," said David. He chuckled, seeing the incredulous look on the other's face. "Oh, we don't do it ourselves, Mr. Roper," he said. "A computer takes care of that for us. You see, each sensor has a profile that it can be expected to follow under normal operating conditions. These profiles, together with variances, are stored in the computer. As the record is being decoded from the crystal, sensor outputs are compared to the appropriate profile, and any significant deviation from that profile is routed to a tape. The 'window', or the acceptable deviation, is set into the computer before the run, and the monitor only looks at the deviations on the tape."

He paused for a moment, studying the picture on the screen. "Let me make one point clear now," he said. "You spoke of finding the cause, Mr. Roper. But we don't really find *causes*. We get readouts from all these sensors, and store them. We know the pile neutron flux or the sodium temperature as functions of time—we know *values*. But we can only guess what caused the parameters to reach these values.

"After we make our guesses, we go down to the lab and try to reproduce the sensor data by artificially inducing malfunctions. If we manage to reproduce the sensor data, we can be pretty sure of our guesses. But we never know *for sure*."

"So, Mr. Regis," drawled Senator Willis. "So how accurate were your guesses with *SeaStar* and the others?"

David Regis shook his head slowly. "Quite accurate, I'm afraid," he admitted. "Very accurate."

"I thought so," said the senator. "Well, Regis, let's have some coffee before continuing."

When the phone chimed quietly and announced, "Lester Mattingly, sir," David Regis set down the coffee cup he was warming in his hands. "Hm-m-m. This must be it. Put him on, Sandra."

Les Mattingly's faintly worried face appeared on the screen. "The tapes are ready for you, Mr. Regis."

"Thanks, Les," said David. "What did you put in?"

"Everything except the spec changes at the first of the tape. I had the normal profiles windowed at the two-sigma point, then labeled and superimposed on the deviations. Uh . . ." he hesitated for a moment.

"Well?" said David.

"Well, there's also a voice transmission—the captain. It's . . . not too much fun. But it pretty well ties the

whole situation down, Mr. Regis."

David closed his eyes.

"Let's hear it, Regis," said the senator.

David took a deep breath. "O.K., Les," he nodded, "put the voice record on first, then we'll look at the sensors."

"Right." Les moved off-screen for a few seconds, then reappeared. "O.K., it's in Memory that way. Ask your display for temporary Tape A. And I'll be here if there's anything else."

"Thanks," acknowledged David. "Sandra, give me temporary Tape A."

"Yes, sir," murmured the phone. There was a moment's silence, then a woman's sultry voice filled the room.

"Attitude, attitude, att—" it said, then cut off as if switched.

"Nice warning beacon," nodded Dr. Fisher appreciatively.

A man's voice replaced it. "Captain!" it said excitedly. "We are stern-low and losing equilibrium. Pitch rate one degree per second, increasing. Fault board shows an open dive-tank valve."

A new voice broke in. "Override, Clark. Close it manually." David recognized Captain Wilkins' voice. "All ahead seventy percent, Mike. Dive vanes down."

"Down, sir?" came a surprised voice.

"Yes, dammit, *down*! We've got to get her stern up."

"Manual override cycled, sir. No luck—valve still open."

"O.K., what's our pitch rate now?"

"Two degrees per second, increasing."

"All ahead full, Mike. Start flooding bow tanks, blow stern tanks!" The hum increased to a discordant buzz.

"Rate slowing, sir. Pitch—minus four degrees." An audible shudder through the ship tensed the four attentive listeners. A siren began screaming somewhere.

David Regis sat stiffly upright, eyes closed and knuckles clenched white. The others hunched forward intently.

"Pitch rate increasing again! Minus five degrees! Minus seven degrees!"

"Emergency maximum power, Mike! Yank the dampers out!"

"Maximum, sir. She's heating up."

The hum climbed to a driving whine that set David's teeth on edge.

"Minus ten degrees, sir! We're losing her!" A crash sounded, with breaking glass and a curse.

"Heat exchanger redline, sir!"

"Keep her there, Mike!" came the captain's voice. "Clark, cut the power to the valve, then turn it on and override. It's *got* to close!"

A frown creased David Regis' face, and he leaned forward.

Another siren began its wail. "Cargo shifting, sir!" came a voice. "Dump!" shouted Captain Wilkins. "Get rid of it!" The sub rocked to a dull explosion that ripped the cargo bay lengthwise, spilling ten million dollars' worth of high-grade rubi-

dium and yttrium into the ocean.

"Still slipping, Captain! Minus twelve degrees."

"More power, Mike!"

"That's all there is, Captain. The exchanger can't take it much longer!"

Warning shouts, screams, a curse fringed the thunder of another crash.

"What happened!"

"Twisting," said the captain's muffled voice. "She'll spin, break up . . . Jennie!" White noise, intense, enveloping, blotted out the voices, then nothing.

David Regis leaned back in his chair, with a puzzled look.

"Horrible!" muttered Mr. Roper, with a shudder. He ran his fingers through his hair. "What was that noise at the end?"

"Huh? Oh . . . the, uh, sound of water coming in, I guess."

"*Water* coming in? But how . . . ?"

"Hard to say," replied David absently. "Could be any of several things—the hull snagging on a spur of rock, for instance." He snorted with perplexity. "Sandra, get me the Sound Lab."

The phone's screen cleared, showing a youngish woman in a lab smock, sitting before a rack full of test equipment. She was looking up into a visiphone mounted high on the wall. "Sound Lab," she said. "Oh, hello, Mr. Regis."

"Hello, Sharon. Look, I want a complete V.P.A. on the voice record off the *Cousteau*. Use temporary Tape A for the first pass, and get the rest from Lester Mattingly, if you need it. I'll want I.D. verification and probable emotional content."

"O.K.," nodded the woman. "I take it you want the results yesterday."

"Right!" David nodded. "Let me know as soon as you've finished." He turned away from the screen just as Senator Willis rose from his chair.

"Regis," he rumbled, "I think you owe us an explanation. Are you trying to make us believe that what we just heard isn't true? What grounds have you for all of this?"

David sat down in his chair and tapped the arm speculatively. "Senator," he mused, "didn't you notice the voices on that tape seemed . . . well, too calm for the situation? They shouted, they were loud, but there was very little panic in the voices. It just didn't sound right."

"Really?" Roper's voice carried overtones of irritation and disbelief. "Are you sure you aren't . . . imagining things?"

David stared at him, through him. "Jennie is Captain Wilkins' wife," he said softly. "Everyone calls her that."

"So?" said Mr. Roper. David's eyes focused on him.

"Ed Wilkins *never* called her anything but Ginger."

David Regis sat uncomfortably in a chair that had folded out of a wall of the cargo sub *Cetacean*, and gazed at the array of displays before him, wondering that the man behind the

control consoles was able to make anything out of the crawling mass of information. Captain Ahrens caught his expression and chuckled.

"The trick is to not look at all of it," he said, "only what you're interested in."

"Don't you need all of it?" asked David.

"Well, not all at once," replied Captain Ahrens. "Matter of fact, the forward sonar view is all we need most of the time. Steering, you know. The rest of the stuff is mostly to keep us happy."

"Oh?" David raised a quizzical eyebrow.

"Uh-huh," returned the Captain, pausing to touch a key or two on his console. He studied the results in one of the displays, made a correction, leaned back. "Actually," he continued, "most of those displays are primarily for trouble indications. But since there's very little of that, most of 'em would be blank most of the time. So other data is displayed. Thrust efficiency, ship depth, floor depth, water temperature, and so on. Information we don't use, generally."

"Why display it at all?" asked David.

"Two reasons," answered the captain. "First, the systems psychologists say that we—the operations crew, that is—are happier if we feel in touch with the ship. Or in control of the ship, perhaps. Second, after a while in a given sub, you tend to become attuned to—well, *rightness*. Sometimes the crew can sense problems before the central computer recognizes that the problem exists. So data isn't really useless."

"But isn't it distracting?" asked David.

"Not at all. You simply don't consciously notice anything but what you're looking at."

"Hm-m-m!" said David. He tried concentrating on one display, and was surprised to find it fairly easy to ignore the rest.

Captain Ahrens took a sip from the steaming cup on his console.

"Now," he said, turning to David, "suppose you fill me in on what this little pleasure cruise is all about."

David smiled. "I was just about to do that," he said. "Captain Ahrens, you and the *Cetacean* are bait."

"I had come to that conclusion," said the captain. "But—bait for what?"

"I don't know," David admitted. "But whatever it is, it can fake inputs to the C.D.R."

"It can *what*?" blurted the captain.

"You heard correctly. We discovered that the voice record from the *Cousteau* was faked—put together from at least five separate sources, and dubbed onto the C.D.R. somehow. With that to go on, we also found discrepancies in the C.D.R.s from the *SeaStar*, *Carpenter*, and *Woods Hole*.

"But *how*—" began the captain.

"I wish I knew," sighed David. "But the best men in the field say

that you *can't* alter the record without destroying the crystal. And if that's true, then they weren't altered. That leaves us with an inside job. A very skillful inside job."

"I agree that someone inside the subs must have turned the C.D.R.s off," the captain mused. "You can't get inside a sub—peacefully anyway—without opening a hatch, and that's recorded, too. But suppose someone could gain control of the ship—wouldn't it be fairly easy to turn off the C.D.R.?"

"No," answered David. "You see, anything that affects the C.D.R.'s operation is recorded, too. Even if power to the laser case discharges and triggers a burst from the diodes. The crystal fairly screams on playback."

"So there's no way to stop the C.D.R. and record false data."

"Apparently not. But apparently someone knows how to get around that little problem."

"So you set a trap for those unknown geniuses," said the captain. "You send out a sub with a full load of nice negotiable industrial diamonds and put extra people in to ride shotgun. Is that what's in their baggage?"

"Pretty much," smiled David. "We brought some small-caliber arms with explosive and knockout rounds, an assortment of gas weapons, and . . ." he hesitated, "well, some special stuff."

The captain cocked an eye at David. "Special stuff, huh? Sounds as if you're planning some surprises. I don't suppose you'd want to tell me about them."

David shrugged apologetically. "It's not that we don't trust you, Captain, it's just . . ." he hesitated again.

Captain Ahrens laughed. "Never mind," he said. "I understand. And I'm not sure I want to know anyway; I sleep badly enough as it is." He paused and looked at David closely. "I apologize in advance for this next question, and you may choose not to answer, but—isn't ambushing a little out of your line of work?"

It was David's turn to laugh. "A little, yes. But somebody had to take the responsibility for spending the company's money like this, and I am the lucky somebody. So I came along to, uh, protect my investment. Besides," he continued seriously, "if everything goes as expected, *we* are the ambushee."

Several days later, David was sitting in front of a forward-sonar repeater screen in the sub's tiny lounge, nursing a glass of iced tea and watching the ocean floor slip past below. They were moving over a region where two of the great plates which form the ocean floor meet, creating a nightmare seascape with vast sheets of granite crumpled and torn like paper. Jagged blades of rock thrust hundreds of feet up from the floor like shoulder blades of buried monsters, and mile-long crevasses opened here and there, with

bottoms too deep to be registered by the sonar. He suppressed a shudder at the hopelessness of finding a ship on that bottom.

A long ridge, broken by steep-sided notches, swam into view at the limit of the sonar's forward range. It stretched across the screen's full sixty-degree field of view, becoming fuzzy and indistinct at the edges. Here and there a peak thrust above the clearance bar painted across the display, and the Obstacle Warning System automatically put the big ship into a shallow climb. David closed his eyes momentarily and could sense no climb, but the clearance bar moved slowly above the peaks. Another ridge, and then another, moved into view, and the Obstacle Warning System kept the vessel moving slowly up to clear them. The view was almost hypnotizing.

David shook himself out of his reverie, and realized with some surprise that they had been climbing fairly steadily for almost half an hour. The terrain still rose in front of the ship, too; apparently they were going to keep climbing for some time. Funny, he didn't remember any such rise along their route. He decided to go up to the command compartment, and check with the navigator.

When he arrived a few minutes later, Captain Ahrens and the navigator were arguing heatedly over a contour map on one of the big wall displays. The navigator, a tall, thin man named Richards, was tapping on the screen with a pointer, and saying, "Dammit, Captain, we have lost almost three thousand feet of depth in the last half hour or so to that blasted rise, and it's not on this map!"

"Are you sure of where *we* are on that map, Mr. Richards?" asked the captain testily.

"Triple-redundant gyrocompasses don't lie," retorted Richards. "At least, they don't all lie the same way. And according to *all* of them, give or take a hundred feet or so, we are *here*!" he said, pointing to a bright pip on the display.

"Either we are not here, or that ridge isn't *there*!" returned the captain vehemently. "And I don't propose to run us aground to see which is correct!"

The navigator shrugged. "I don't see what real difference it makes. We either have to turn around or go up and over. The ridge is likely to be just as low here as anywhere." He gazed at the sonar display and shook his head.

"What's the trouble, Captain?" asked David.

"Oh, hello, Regis," said the captain. He waved a hand at the display. "We've been climbing for—" he touched his watch, "for almost an hour, over a rise in the ocean floor that's not on our chart."

"How new is it?"

"The chart? Oh, a year or so old, I guess. But then things change pretty slowly down here."

"I was referring to the ridge," said David. "From what I can see, that thing could have been pushed up yesterday. Looks pretty rugged."

The navigator shook his head. "No current down here to round any edges, no temperature differentials, no erosive forces of any kind—except maybe the fish."

"Anyway," put in Captain Ahrens, "a quake strong enough to move that much dirt would rattle every tooth on the planet and cause displacement tidal waves that would wash away coastal cities all around the basin." He bit his lip. "Nope, that baby's been around *quite* a while."

"Well, what now?" asked David.

"I think that's up to you, Mr. Regis," replied the captain. "Normally, we'd surface and get a bearing from the synchro satellites before proceeding. In the present circumstances though . . ."

"I see what you mean. It might spook our friends, and this expedition is too expensive to ruin, if we can help it." He ran a hand through his hair. "Looks to me like we'd better do exactly what you would normally do," he decided. "Besides, I don't like not knowing where we are. Sorry, Mr. Richards," he said, turning to the glowering navigator, "no reflection intended, but something is obviously wrong here."

"Good!" said Captain Ahrens. "I was hoping you'd feel that way." He turned and touched a contact on his panel. "Prepare to surface for navigation check. Repeat, prepare to surface for navigation check." He looked back at the map, shook his head, and said, "O.K., pilot, take 'er up."

The submarine rose smoothly through the black, clinging water. As it neared the surface, Captain Ahrens turned to David. "If you'd like to come to the bridge with me, I'll have the pressure curtains drawn so you can watch the last hundred feet or so of the ascent."

"Fine," agreed David. "Maybe we can see the top of that ridge when we surface."

"I won't believe it's there until we run aground on it," muttered the navigator. David laughed and followed the captain into the passageway.

The bridge was located two levels above the command compartment, at the very front of the ship. It was a smallish round cabin, with windows all around affording a three hundred and sixty degree field of view, with the pressure curtains retracted. Several repeater screens were placed around the cabin above the windows, with ship conditions displayed on them. David sat in one of the swivel chairs at the room's center, and watched the sea turn from murky green to lighter shades.

A few fish were visible in the distance, but the sub's ascent was rapid enough at first to have disturbed most of the sea creatures in its path. At a depth of fifty feet or so, the sub slowed, and rose very gently. "Gives

things a chance to get out of our way," explained Captain Ahrens. "Even at that, we almost always end up with a shark or something trapped on deck. They can get pretty smelly if they aren't found soon, too." David nodded understandingly, and gazed along the vast length of the ship, out to where it merged hazily with the sea. He fancied he could see a larger fish moving near the hull, but it was much too indistinct for certainty.

"Captain, a hull sensor reports collision with something small. Sector J, topside," said a loudspeaker. "No damage."

"Very well," acknowledged the captain. "Probably a floating log, or something similar," he said to David. He chuckled. "I remember an incident on my first sub cruise—"

A loud CLANK! interrupted him; a second clank followed immediately.

"More collisions, Captain," said the loudspeaker. "Both in Sector A, port and starboard, just below waterline. No damage there, either."

"Strange place to get hit," mused the captain. "The water flow tends to keep objects at a distance, for one thing, and whatever hit us is neither floating nor sinking. Sounds almost intentional."

"Look, Captain!" exclaimed David, pointing out the front window segment. Forty yards away, a scuba-suited figure on a one-man torp drove toward them through the water, with a hemispherical object slung beneath the torp. It reached the sub just as the bridge was beginning to breach the surface. Foam boiling over the windows obscured the view outside, but another metallic collision was felt just below the bridge.

"What was *that*!" shouted Captain Ahrens in amazement. "Was that a *man*?"

"I think so," answered David. "But what is a man doing out here? We're nowhere near land, are we?"

"Captain!" interrupted the radio. "*Another* collision—this one was right over our heads!"

"Yep, we saw it coming," replied the captain. "I don't—"

He was interrupted by the BEEP! of the all-hands circuit. At the same time, a panel marked "Ext. Comm." lit up above the display panel.

"Well, I'll be damned!" said the captain. "He's plugged himself into the external communicator jack in the outer hull service panel."

"Ahoy, *Cetacean*!" came a strangely burred voice over the intercom. "You are captured. We have placed four magnetic mines on you, above your main hatch, below your forward waterline, and above your command compartment. If detonated, these mines will destroy your controls and sink your ship. The mines are radio-detonated; we suggest you don't operate your radios. You might pick the wrong frequency. Tune your transceiver to 1.23 megahertz; we will radio further instructions. We will also monitor

1.23 megahertz; we will detonate the mines if your transmitter power exceeds one watt. Repeat: tune to 1.23 megahertz; do not exceed one watt transmitted power." A sharp click followed, and the external communicator panel went out.

There was a moment of stunned silence as the water drained off the windows. David Regis and the captain watched the torp and its rider surge away from the *Cetacean*, toward a rather large nondescript cruiser that could be seen lying about a half mile off the sub's port bow. The wakes of several other torps converged on the cruiser as well.

"Huh!" grunted Captain Ahrens finally. "I hope you have some fancy tricks up your sleeve, Mr. Regis. Oh, well . . . tune to that frequency, Mr. Carlyle."

"We're there, sir," came the answer from below. "No word, yet."

"O.K., Mr. Maclise, let's get some men out to look the mines over. Photographs, phones, magnetometers, Geiger counters, and anything else you can think of. We need to know what those things are."

"Right, sir," answered the crew chief.

"Mr. Richards, get me a new fix, and update your gyros. Mr. Carlyle, establish a send and receive at 1.23 megahertz, and mind that one-watt transmit limitation. Patch it in all over the ship so everyone can hear."

A pause, then . . . "Done, Sir."

Captain Ahrens jerked a pair of binoculars from the rack above and looked at the distant cruiser. "Can't tell a thing about it," he said. "Looks like a converted—" He was interrupted by a voice over the speaker.

"Ahoy, *Cetacean*! No need to transmit at all. You will descend to fifty feet when this message is finished. Further instructions will appear on your forward-looking sonar display. Please comply quickly and completely with these instructions; otherwise we will detonate the mines and sink your ship. Watch your forward sonar screen, and begin your descent to fifty feet immediately."

Captain Ahrens turned and headed down to the command compartment, motioning David to follow.

"Belay that inspection order, Mr. Maclise. Get your men back inside, then report. All hands, prepare for descent."

As they entered the command compartment, the main screen flashed READY FOR DESCENT. "Take 'er down," nodded the captain. The huge bulk of the *Cetacean* began to slip below the surface.

Captain Ahrens put the forward-looking sonar display on the main screen, then sat back. As they neared the fifty-foot mark, bits and pieces of letters began to appear, and form words. The crew stared in astonishment. As the ship leveled off, the message stabilized. The letters were fuzzy and varied in contrast but could be read easily enough:

TURN OFF YOUR SONAR TRANSMITTER. LEAVE RECEIVER ON–STEERING COMMANDS WILL APPEAR HERE. DO NOT RADIATE–WE ARE MONITORING.

The message faded, and was replaced by another:

TURN OFF XMTR.

"O.K.," sighed Captain Ahrens. "Shut down the sonar, Mr. Richards."

"But, Captain," stammered the navigator, "we'll be blind."

"We'll have to trust them. We can do without sonar easier than we can do without a hull."

The forward sonar screen went black as the transmitter was turned off. A second later a band of white appeared, leading straight off into the blackness and dwindling in the distance like a highway. An arrow pointed along this path, and a legend under the arrow read 10 KTS.

"How are they *doing* it?" murmured the navigator.

"Same way they generated that ridge, I imagine," said David.

"Huh? You mean . . ." Mr. Richards broke off and stared at David.

"Why not?" replied David. "If they can put their own roads and billboards on our display, they should be able to put terrain on there, too. We were riding through water with nothing in front of us, so they didn't have to worry about echoes from real objects interfering with their fake pictures."

"Sweet," nodded Captain Ahrens.

"They sit up there on the surface, and wait for our sonar pulses. When they know we're coming and where we are, they beam a phase/amplitude-adjusted signal back at us, and paint mountains on our display. We think we're lost—I apologize, Mr. Richards—and surface, where they slap magnetic mines on us. Oh, boy!" He ran his fingers through his hair, and slumped in the chair. "Oh, boy!"

Several hours later, David was sitting in the command compartment, warming his hands around a big mug of coffee.

"We can't really make any detailed plans," he said. "We have no weapons that can be used underwater. We've discussed various plans for use when—or if—we surface, but we can't pick one until we know the situation. We'll just have to wait and see what comes next, and then use whatever tactics seem appropriate."

The captain nodded. "Well, at least we'll know roughly where we are, for whatever good that does us. Mr. Richards says the inertial nav set won't drift significantly for several days and we ought to get wherever they're taking us before too long."

"O.K.," acknowledged David. "I've had a message made up to let the folks back home know what happened. We can send it as soon as we surface."

The captain shook his head. "We won't be able to get two words off. They'll blow the mines as soon as they hear us transmitting," he said.

"Oh, there'll be plenty of time for this message," replied David. "We brought a burst transmitter with us. It's a pretty clever affair: you just transcribe your message into Morse Code and put it into the computer, where it's time-compressed by a factor of about ten million, and stored. It's available for transmission any time after that. What we've done is to rig the unit to repeat the message until we stop it. The message runs about a millisecond when compressed, so we should be able to get off fifty repetitions before they push the button. Of course, it's a last resort; we can expect to be blown up when we start sending."

"Can we be sure anyone will hear it?"

"I think so," answered David. "We'll beam it to one of the synchronous satellites, and somebody will read it sooner or later." He paused, staring at the desk. "Not that it'll do *us* much good," he muttered.

"Looks like another jink coming up," said the captain, nodding at the main screen. The broad arrow marking their path appeared to take a turn in the distance.

"I don't know who they're trying to fool," grumbled the navigator, "but they can't confuse *us* this way."

"Maybe they're leading us around things," put in the captain. "Are we near any shallow water, Mr. Richards?"

"Nope," replied the navigator. "Could be some uncharted guyots,

perhaps, but we're a good thirty hours away from any water less than about two thousand feet deep."

"Thirty hours, hm-m-m?" the captain rubbed his chin. "Are we headed in that direction?"

"No, sir, not right now," said the navigator. "But we've been headed more or less in that direction since we started." He touched a button on his console, and the forward sonar map flicked over to an auxiliary screen, to be replaced by an oceanographic projection. A dotted line meandered across the map. "Here's our course since we surfaced," explained Mr. Richards. "The small figures beside each leg of the course is our average speed." He drew a fingertip light-pen across the monitor at his console, and a streak appeared on the main screen. It pointed to a group of small islands in the corner of the screen.

"See how the general course leads toward these emergences? I make it—oh, thirty-five hours, if they don't change our course or speed much."

"That's about right," nodded David. "We'll be missed in another forty-eight hours or so, and those boys up ahead will have plenty of time to take out our Cruise Data Recorder, work their black magic on it, and dump it where they want it."

"We don't have much time to get a message out," muttered the captain. "We've got to do *something*!"

"We have to come up with something they aren't monitoring," said David. "Maybe we could hook up some ultra high frequency stuff."

Mr. Richards shook his head. "If the pirates can't receive it, no one else will be able to. Nope, the radio is out."

"What else is there?" demanded the captain. "They're monitoring us acoustically, even if we had enough acoustic power to reach anyone else. We don't have any way to make much of a light—and besides, they would be sure to see it."

David's eyes narrowed suddenly. "Not necessarily," he said. "Suppose we use infrared?"

Captain Ahrens looked at him blankly. "If they couldn't see it, who could?"

David pointed up. "The big eye in the sky," he said. "N.O.A.A. has a whole fleet of satellites up there with multispectral scanners aboard. If we can make a bright enough IR light, they'll see us."

Everyone sat silent for a second, absorbing the idea.

"Now all we need is an infrared light source," said David finally. "Any ideas?" No one spoke. David slumped back into his chair.

"How bright does this thing have to be?" asked Captain Ahrens slowly.

"Hm-m-m," thought David. "Those scanners can detect temperature differences of a degree or so, but it has to be over a fairly large area—say fifty to one hundred feet across. A smaller source has to be correspondingly hotter."

"I think," announced the captain cautiously, "maybe I know where to get your flashlight." He patted the cabin wall next to his chair. "*Cetacean* herself."

It was David's turn to look blank.

Captain Ahrens leaned forward. "This vessel is propelled by a heat engine," he explained. "The wasted heat is discharged into the water flowing past us, and raises the temperature of that water. Right now, that temperature rise is small, because we're moving fairly slowly and operating efficiently. But we can make that water good and hot by increasing the pile output and venting the extra heat. We should be able to raise the surface temperature five or ten degrees, for twenty or thirty feet to either side of the boat. We can even leave dots and dashes of hot water by turning the pile up and down!"

David nodded in vigorous and pleased agreement. "Thanks, Captain," he said. "You've probably just saved our lives." He picked up a pen. "Well, what shall we say?"

Fifteen hours later, a bored photo-interpreter at N.O.A.A.'s satellite reconnaissance facility in Albuquerque picked up the next envelope in his IN chute, read the I.D. tag, and groaned. "The South Pacific M.S.," he said. "That's the second blasted multispectral I've had today!"

The man at the next console looked up. "You just don't have the right attitude, Fred." He produced a battered yellow handbook from somewhere, and waved it about. "It says right here in the National Oceanic and Atmospheric Administration Handbook on Satellite Photo-interpretation that 'resolution of multispectral anomalies represents the greatest challenge to the photo-interpreter'. Don't you want to be challenged?"

"They don't pay me enough to challenge me this much," returned Fred. "Why doesn't somebody invent a computer that's smart enough to resolve those 'anomalies' itself?"

"Economics, my boy, economics. They can hire you cheaper than they can re-educate the computer. Besides, it keeps you off the streets."

"Yeah, yeah," muttered Fred, as he took the film strip from the envelope, and threaded it into his viewer. "Well, let's see what the computer couldn't understand this time . . ."

The image that appeared in the viewer was a false-color presentation. Each of the nine bands that the camera operated in had been assigned a specific color, from red for the 8-14 micron band to blue for the 0.5-0.35 micron band. The result was a dazzling melange of color that would have been impossible for an untrained observer to understand. Even a highly skilled interpreter could scarcely have extracted one percent of the information contained in the composite.

The computer had seen it first, however. It had gone over the photo-

graphs micron by micron, using highly sophisticated optical/digital processing techniques to compare, correlate, transmit, reject or store virtually all of the information in them, and it required Fred's help on less than one-hundredth of one percent of that information.

Fred looked at the composite long enough to orient himself, then touched a contact. The screen almost went blank as the computer removed the uninteresting areas. He leaned closer, and began examining the anomalies. Area 1, a small irregular blob near the center that showed up thinly in the 0.9-0.8 micron band, was probably some stratospheric turbulence—a big jet-stream eddy, perhaps. Area 2 was a series of bright blue speckles that covered almost all of the left side of the image. It looked to Fred like noise in the camera electronics. A brief shower of cosmic rays could do it, also. Area 3 was a line of short red dots in the 8-14 micron band, in an area of deep ocean. It seemed too regular to be only noise. Fred asked the computer for a temperature differential between the spots and the background, and whistled in amazement when it came.

"Nearly five degrees centigrade over an area of—oh, twenty-five hundred square feet in the smaller dots!" he exclaimed. "Something down there is *hot*!"

"What is it?" The man at the next console came over and peered at the image.

"I don't know," said Fred. "A series of volcanic vents, maybe?"

"Not likely," said the other. He glanced at the location code on the picture. "That water's deep there—a mile or so, at least. A series of vents would have to be within fifty feet of the surface to produce localized heating like that. And if the sea floor had come up that far any time recently, every seismometer in the world would be having convulsions." He looked closer. "Whatever it is, it's calling for help."

"Huh?" said Fred.

The other man pointed to the image. "There's a blob, then three dots, three dashes, three dots, a long space, three more dots, and a dash. S-O-S and another S."

"Does sort of look like that," Fred agreed.

"Could it be?" asked the other.

"N-n-no," answered Fred, thoughtfully. "In the first place, that's—let's see—almost half a mile from start to finish, down there. In the second place, it would take a tremendous amount of energy to heat up that much water. Anybody with that much controllable energy on tap shouldn't need help."

The other man laughed, "I was just kidding," he said. "You've probably got something highly reflective floating down there, and it just looks hotter. Wait and see if it shows up in the next pass."

Fred nodded. "Sure, I should have thought of that." He tapped the "Cycle" button on the console, and

began examining the next frame. After several minutes, a puzzled look crossed his face. He rechecked the Greenwich Mean Time at which the scans had been made, then asked the console for local time.

"Hey, Jack," he called the other interpreter. "That high reflectivity suggestion of yours didn't pan out, quite."

"How come?" asked Jack.

"It was just after midnight, local time, when those pictures were taken." Fred tapped his chin with a pencil. "I think I'll put a priority tag down for the next set of shots over that area."

Jack lifted his eyebrows. "You really think that might be a signal?"

Fred shrugged. "Won't hurt to see," he said.

"Captain, we're going to run into trouble if this thermal cycling keeps up." David Regis traced a finger across a chart in the manual on his desk. "According to the Test Standard, our heat-transfer chambers are proof-tested by twelve hours of rapid thermal cycling from zero to a hundred degrees centigrade."

"We aren't cycling over quite that range," replied Captain Ahrens. "The output water varies from about fifteen to eighty degrees centigrade."

"Yes, but we've been doing it for almost fifteen hours now," returned David. "Besides, these proof tests are usually made at a hundred and twenty to a hundred and fifty percent of the design performance requirements." He shook his head. "I've never been sure that we weren't just inducing damage during those tests. At any rate, I don't think we can trust the cooling chambers through much more of this."

"O.K., we've repeated our message several times now. Let's just run the chambers hot for a while. That will at least leave a continuous trail."

"Another five-knot increase, Captain." The navigator nodded at the forward sonar screen, where the legend now read 20 KTS.

"That's going to cut our signal down some," said Captain Ahrens. "We're going to be using most of the pile output just to push us through the water. Another increase like that and we won't be leaving much of a trail."

"We're going too fast as it is, to suit me," said the navigator. "We're going to make those islands in less than twelve hours at this rate."

"It's time to decide what we're going to do when we get there," said David, clenching his jaws.

"O.K.," said the captain, "we've got to assume that our friends up there are interested in the diamonds, rather than us. That makes us pretty expendable after they get the cargo."

"You're right. Our only chance is to stay with the sub as long as possible, and try to bargain if we have to. As long as we're inside, they can't get to the cargo without blasting a hole in the hull. I don't suppose they'd hesitate to do that, but we can

at least make it hard for them."

"I don't think they'll want to do that," said Captain Ahrens musingly. "The sub itself is worth a hundred times the cargo. I can't see them spending this much money for anything the subs can carry. What were the other subs carrying?"

"Oil and ores, mostly. Now that I think about it, one of them was just carrying some specialty foods—it was on its way to pick up a load of North Slope Oil." David nodded to himself. "So it was the subs they were after!"

"That means some pretty big financial backing—too much for just a gang of modern pirates."

"We knew they were no cheapskates," said David. "After all, we still don't know how they can alter the Cruise Data Recorder. And this trick with the sonar," he gestured to the main screen with its superimposed highway, "isn't the work of amateurs."

"A thing like this could strain the resources of a small country," put in the navigator.

"So all we have to do is decide which country," said David.

"Country?" said the captain. "Are you serious?"

"Who else could use a fleet of nuclear subs? A company couldn't: the Nuclear Fuel Authority monitors all the fuel for commercial shipping."

"That narrows it down, some," said the captain. "Whoever wants the ships has to have all the supporting technology. And there aren't too many nations around that have the technology but not the subs."

"Well," said David, "that still isn't getting us anywhere. We have to decide what to do now."

"I'm for sticking with the sub, and waiting them out," affirmed the captain. "If they detonate those mines, we'd be in trouble, but I think they want the sub too much for that."

"Could we tell them that we've rigged the engine to explode if the hull is breached? Maybe that'll keep them off our necks for a while."

"The pile *can't* be rigged to fission," said the first officer. "The fuel is embedded in graphite rods, and you can't get enough of it close enough to exceed critical mass."

"*I* know that," said David, "but do *they* know it?" The men stared at each other, weighing the idea.

Captain Ahrens shrugged, and broke the silence. "It's worth a try."

At almost the same moment, a display panel in the photointerpreter's room at N.O.A.A. Albuquerque lit up, proclaiming PRIORITY LOADED. A man at a nearby desk noticed, and called, "Fred, your priority shots are here."

"O.K., thanks." Fred returned to his desk, touched a contact, and nodded to himself. Another contact wiped out everything on the screen but the eight-to-twelve micron imagery. Fred stared at the line of tiny dots and dashes extending across the screen. Then he picked up a card marked "Morse Code," slipped it

into the "Program" slot on his console, and tapped out the dot pattern on his screen. When he finished, he tapped another key, and accepted the strip of tape disgorged by the computer. He read it over, slapped the console off, and headed for the door.

"Hey, Fred, you leaving already?"

"No, I'll be back. But I think I may have earned my salary today." Fred waved the slip of paper and left almost running.

". . . And that's about it," said David Regis. He was sitting in a huge green chair by an equally huge window that looked out over a wooded park. He sipped at a drink.

"After we got to their base (which turned out to be a beautiful natural cavern under one of those little islands), we just sat there threatening each other. They blocked up the entrance so we couldn't move the sub, and I think they would have detonated the mines to get to the C.D.R., if we hadn't bluffed with a 'rigged' engine pile. But the cavalry got there finally, so here I am."

"Extremely well done, David," said Colonel Woell. "Using the engine's waste heat as a signal was ingenious."

"I thought so, too," agreed David. "Bill Ahrens can be mighty proud of it."

"I understand that you resolved the method used by the pirates to alter the C.D.R. data."

"That's right," replied David. "Actually they didn't alter anything. They simply removed the C.D.R. crystal, put in a blank crystal, and transferred all of the preliminary information from old to new, at very high information rates. Then they finished by impressing a prerecorded sequence simulating the sub's destruction on top of that. Very straightforward, and very ingenious."

A bell chimed softly somewhere. Colonel Woell touched a contact on his desk, and quickly read the message on the desk screen. "Excellent, excellent," he said. "David, the other subs have been located, from the information we obtained from the captured pirates. Discussions with the government responsible are under way, and we will doubtless have the subs and cargoes and crews back soon."

"Crews?" said David in amazement. "The crews are alive?"

"Apparently so," smiled Colonel Woell. "They have been kept alive to teach the subs' workings to the people who were assigned to operate

QUESTION:

If there are creatures from space exploring us, wonder how they finance their space program?

them. We should get them all back."

"That's *wonderful*!" cried David. "That makes the whole venture worthwhile. I don't mind telling you that there were a few times I was sorry I ever started this." He shuddered. "When I think of those magnetic mines stuck to the hull of the sub . . ."

Colonel Woell looked puzzled. "I can understand your being worried at the time," he said, "but now that you know there was no danger . . ."

"No danger?" said David. "If those jokers had leaned on the wrong button, I'd be fishfood now!"

The colonel broke into a slow grin. "You mean you don't know about the mines?"

"Huh?"

"The mines. They wouldn't have worked." While David gaped, he shuffled through a file folder on his desk. "Ah, here it is," he said, and handed a sheet to David. "The technicians who removed those mines found that the firing mechanisms were completely corroded. Whoever modified the mines to be triggered by sonar apparently assembled the triggers in a dusty atmosphere, because sand scratched the valve seats and perforated the seals. Seawater got in, and ate up the insides."

David read the memo, shaking his head slowly.

"We played our hand closer than we knew," he said. "According to this, the trigger latches were released on all those mines. They probably *did* try to detonate them." He drew a deep breath and laid the memo aside.

"Looks like *Cetacean* was saved by some Foreign Object Damage," noted Colonel Woell. "I'm rather pleased about that, even though you and *Cetacean*'s captain had already solved our problem."

David laughed. "I'm pleased, too. This business has allowed me to satisfy a lifelong ambition."

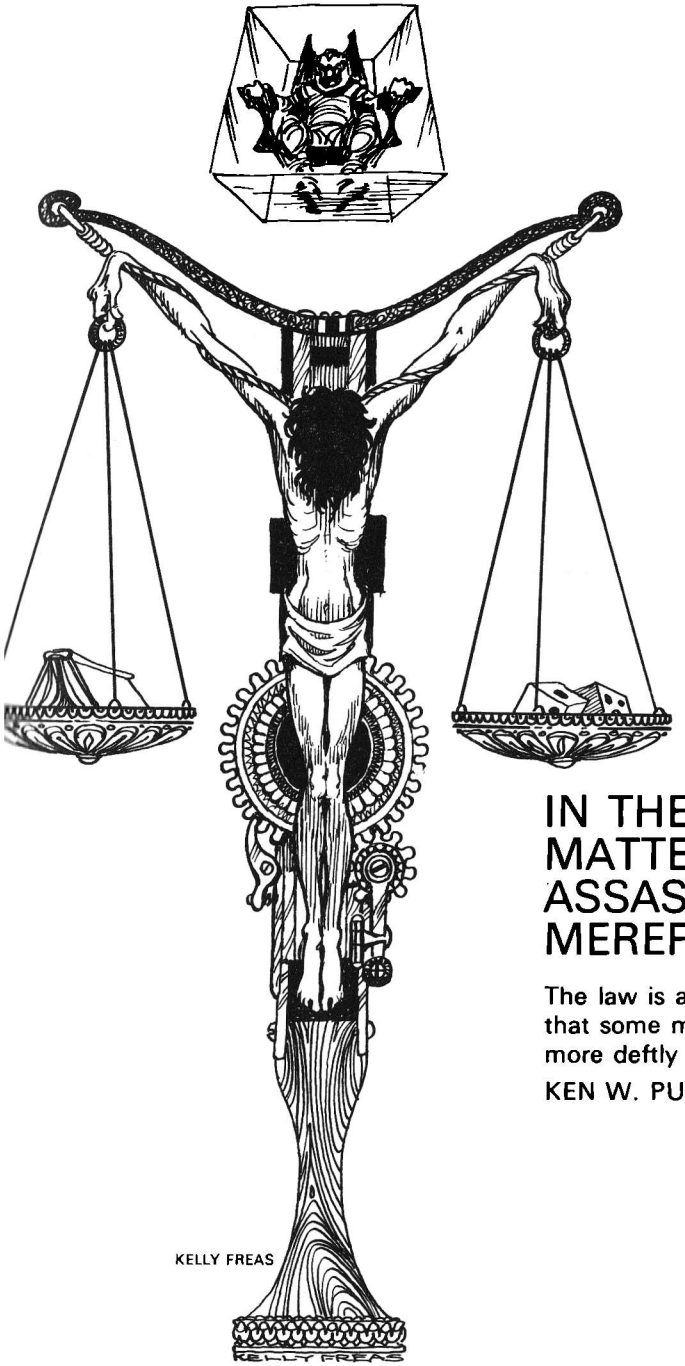
"I didn't know you were a frustrated cloak-and-dagger man."

"Oh, no," said David quickly, "that's not the ambition I meant." Colonel Woell raised his eyebrows. "You see I've always wanted to have tangible evidence that I was worth my salary. And since it was my idea that resulted in saving four subs, worth maybe forty million dollars apiece, and it costs the company about seventy-five thousand a year to support me and my office—let's see, I've been here ten years so that's seven hundred and fifty thousand—I've cost the company three-quarters of a million dollars. So if I never make another dollar for the company, we will be even in—let's see—about two hundred and thirteen years." David leaned back contentedly.

"Don't start relaxing too soon," replied the colonel. "You actually have fewer than twenty-five years paid up, so to speak."

David looked at him.

"You've forgotten," said the colonel, "that the company only pays five percent of the savings resulting from employee suggestions." ■



IN THE MATTER OF THE ASSASSIN MEREFIRS

The law is an instrument
that some men play
more deftly than others.

KEN W. PURDY

The judge enters the courtroom. Think of him as a man of middle age: a hundred and twenty-five or so. Being a judge, he has no name. See him going into the bench. (Nothing in the law is more fascinating than its persistence in looking backward; indeed, is not the law in its entirety based on backward-looking, the search for precedent? So we still call it the bench, although it is only a cube of flexibo big enough for one man, and judges wear around their necks a scrap of black, relic of the robes of ancient times. Such is the nature of things.) So, he enters, he sits, the bench rises soundlessly halfway to the ceiling, he stares down upon us, implacable, merciless, and he speaks.

"The matter before this court," he says, "is the trial of the assassin Merefirs. The gavel has fallen."

The persecutor is Dafton, flat-faced as a door, reedy, impalpable, a century of mediocrity behind him. His assignment is a doom-cry for Merefirs: Dafton draws only certainties, and has for years, since a boy barely sixty, a year out of law school, pinned him to the wall in an easy and insignificant first-degree mopery case. Well, legally insignificant, but alas for poor Dafton, a son of the then Regent was a principal, and Dafton's career was forever blighted. Such is the nature of things.

"If the court will but indulge us," Dafton says, "the state will briefly review the crime for which the abominable Merefirs is to be put to maceration.

"Azulno, or perhaps I should say, as all who were living on that tragic day know, the Regional Eminence Fallet was, while in the performance of his public duty, namely and twit, the dedication of the 101st National Euthenic Unit, in this mega, made dead by the assassin Merefirs. Of the commission of the crime, azulno, there is no shred of question: the affidavits of 246,744 actual witnesses have been deposited with this court, and I may say that I myself did see, before the said affidavits were put under seal, a convincing sampling of them. There can be no doubt that they are genuine affidavits in every particular. Further, the Media Communicative Authority has verified that on that day, indeed at the relevant millisecond, 196,593,017 citizens, and a lesser but still weightily significant number of humans, and rather more than a million subhumans, in the categories of slaves, servants, sexers and so on, experienced the tragedy on the telfee. The assassin Merefirs is guilty beyond all question, and it is a mark of the mercy of the present Eminence that the state requires that his punishment be merely the mild one of six-hour maceration. Fibular disintegration would be a more fitting punishment, if I may intrude a personal view, and . . ."

The judge clears his throat, a sound for all the world like the death rattle of a foggus.

"You may intrude nothing, fool," he says. "You should yourself have been macerated decades since. Proceed."

(Here we see the clear thread of modern jurisprudential connection with the ancient Anglo-Saxon law: the judge as impartial arbiter, friend of no one, no one's foe.)

"If it please," Dafton says, "I most humbly agree. The state rests."

The judge speaks.

"We will hear, briefly," he says, "the attorney for the despicable Merefirs."

This is Terravan, the legendary Terravan, savior of lost causes, snatcher from the brink, whose tongue, they say, is gold—and all the rest of him, too. Merefirs, a mere civil servant, could not afford the price of a nod from Terravan, much less a five-minute appointment with him. Terravan has taken the case without fee and out of sheer bravado because no one else in this mega, or any other, would have the temerity. It is a hopeless case, and not only that . . . the assassination of a Regional Eminence? Any other lawyer would well know that if by wild chance he won an acquittal, exsanguination within twenty-four hours would be the very best he could expect. Terravan is beyond all that, being famous, rich, and deeply knowledgeable, as we say, as to where the bodies are buried. Such is the nature of things.

So Terravan rises, a short, heavy, feral-looking man, barely a century old, full of fire and ferocity.

"If it please," he says, "I will not contest the statement of Persecutor, uh, hm-m-m, Persecutor, ah, yes, Dafter, Dafton. My client, the assassin Merefirs, did in fact kill, or make dead, the Eminence Fallett. Of course he did, and with premeditation, with every intention. His sole purpose in attending the dedication was to strike down the Regional Eminence, and he did strike him down.

"But that is not the point, as I shall make clear. I call to witness the assassin Merefirs."

Two men in the ruby-red uniform of warders wheel him in, strapped nude to the witness-stretcher. From the bright life-support box at the head of it the usual wires and tubes lead into him and out of him, serous fluid pump, heart-actuator, oxygen supply, renal filter, waste-exhaust, and so on. When they have him in place at the foot of the bench, they switch the litter to upright, and there he stands, more or less, clamped. The spectators spontaneously applaud, and I must say I myself join in. From head to toe, Merefirs is spectacularly multicolored, and the pattern of the bruises, from the merest blush of pink through mauve and yellow to deep purple, clearly shows, as if he had been signed, the work of the famous chief warder Toddi. Toddi's preliminary witness-beatings are the despair of his competitors, and well they may be. Aes-

thetics aside, however, Merefirs does not look well. As a human person, he does not look well. He is by no means whole, various parts of him are missing, his head is notably lumpy—he simply does not look well, although I must say I have seen witnesses in much less important cases, matters of mere civic accident, for example, who were worse off. But, to be sure, they had been in hands other than Toddi's. And I knew even before he spoke into the microphone that his voice would be strong and firm. Toddi can spend a day and a night at his work, and yet, the witness will always be able to speak clearly. It's a kind of art, I suppose. But I mustn't digress.

Terravan puts his client through the standard preliminaries, age, birth lab, citizen class, and all that.

"Now then, assassin," he says, "when you made dead the Eminence Fallett, your weapon was not a dessicator, a defbro, a B-kel or any other common killing device, is that true?"

"That is true," Merefirs says.

The judge speaks.

"Terravan," he says, "every idiot in the planetis knows he did not use a common weapon. You are wasting my time. I will remind you—once—that my patience is not unlimited."

"I humbly thank you," Terravan says. "And if no common weapon, assassin, what did you use?"

"I used a crossbow," Merefirs says.

"Describe it."

"The crossbow was a weapon of the ancients of the planet Earth," Merefirs says, "a sophistication of the plain bow, which was a piece of wood—a fibrous material that once grew wild—bent by a cord, throwing a second piece of wood called an arrow. The crossbow came to its full flower in the Sixteenth Century, Earth Reckoning, so there are few who know of it now."

"Why, assassin, did you choose this obscure weapon?"

"Because I could be almost sure that no one would recognize it as a weapon. Therefore, I could freely carry it, and easily approach the Regional Eminence."

"Tell me," Terravan says, "how could you be sure that this primitive device would be effective in your foul purpose?"

"A crossbow of the ancient Earthians," Merefirs says, "would throw an arrow through a thick piece of strong wood and through a man behind it. Also, it would hit an object as small as the palm of a man's hand at a long distance, say a hundred tontas. It seemed in every way suitable for my purpose, and so I built a crossbow on the patterns of the ancients, known to me through study."

The judge interrupts.

"So you admit, wretch, that you read, you studied, as you say, outside the curricula prescribed for Class II citizens?"

"Yes."

Terravan waits for the judge to speak again. He will not.

"So you made ready your weapon,

you approached to within twenty-five tontas of the Eminence and you killed him," Terravan says. "Why?"

"Because he was a heretic," Merefirs says.

A gasp, a rustling of whispers runs through the courtroom.

"Animal!" the judge says. "It is not enough that you assassinated the Regional Eminence, you now defame his memory. This trial is over. The sentence imposed by the persecution is now confirmed. The gavel has . . ."

"If the court please!" Terravan shouts. His voice booms through the room. Clever man! And quick! If the judge had pronounced the word "fallen" the trial would in fact have been over, and no appeal would have been possible.

"I most humbly beg the pardon of the court," Terravan says. "I throw myself upon your mercy, O Judge. But I must, in fulfillment of my obligation as defender of this despicable criminal, say to you that the question of the Regent's orthodoxy or the lack of it does in fact go to the heart of the matter, and I pray leave to develop it. I can cite ample precedent."

"Terravan," the judge says, "one day, you will outrage this court past tolerance. You are a proceduralist. Your obsession with the rights of the accused, as against the rights of the persecution, will eventually, and properly, bring you to the macerator."

"I humbly agree with the court," Terravan says, not being an idiot.

"Against my will, and against all reason," the judge says, "I will be generous. You may attempt to cite precedent."

"I thank you. I cite the case of State versus Hamill, 1186/6V, Archive 29, Volume 617, Page 113, in which the court found that the clearly heretical belief of the defendant in monogamous male-female relationship bore directly upon his crime, even though that crime was most heinous, being in fact arglebub in the first degree."

"You reach a long way for your precedent, Terravan," the judge says. "State versus Hamill . . . that was in the year 2125. You cite ancient history."

"True, O Judge," Terravan says. "But—you will forgive my making an absurdly obvious observation to so learned a jurist as yourself—for the record I must point out that the verdict of the court in State versus Hamill was never overturned, and no counterprecedent was ever established."

"An oversight," the judge says. "However, what you say is true enough. You may proceed. Take heed, however. You have been warned."

"I humbly thank you, O Judge," Terravan says. "Tell me, assassin," he goes on, "in what way did you conceive the Eminence to be heretical?"

Merefirs clears his throat. "I ap-

pear to be dying," he says. "Perhaps if the oxygen level could be . . ."

One of the warders fiddles with the life-support system.

"Thank you," Merefirs says. "To answer the question, when the Regional Eminence Fallett came to office he did, azulno, appoint me his Primary Postilion, and in this capacity I was privy to his communication core. On the twelfth day of Hobe, in this subera, I learned of his heresy. I was making a routine run-down of the core when I heard the voice of the Eminence—and, I may say, in synch with his image—dictating what was clearly an entry in his private journal. Obviously, he had forgotten to null the fansponder. I was shocked by what I heard. I was stunned. I reran the core, and I committed the entry to memory."

"Please repeat it," Terravan says.

"The Eminence said: 'Today I took food with that moron Javil. It was all I could do to appear to eat, realizing that this specimen of evolutionary disaster is Secretary to the Planetary Council. He went on at great length about the Venusian war. He wants me, in my subcapacity as Obliterative Authority, to support his resolution to throw Venus out of orbit. This is flaming nonsense: we will lose at least a million useful slaves. And, truly vomitous, I will of course have to go along with him, and he knows it.' "

"That is the end of the quotation?" Terravan asks.

"Yes."

"You were naturally horrified to find that your superior, a trusted official, would entertain, much less record, such evil concepts?"

The dough-faced Dafton rises. "I suggest to the court," he says, "that the learned Terravan is coaching his witness."

"True," the judge says. "Furthermore, I warn you, Terravan, do not outrage this court by attempting to present your bestial client in the role of savior of the state, armed in righteous wrath. I warn you!"

"Not at all," Terravan says, "but I will point out that the Eminence did in fact support the Javil resolution, and that the planet Venus, azulno, was in fact deorbitized. Therefore, the Eminence's private reservations did constitute heresy and he was in fact a heretic."

"Terravan," the judge says, "this has nothing to do with the case before us. Your client, a loathesome sneak who abused his place of privilege by memorizing his superior's journal entries, heretical or not, still acted illegally in assassinating the Eminence. Your point is totally irrelevant."

"I beg to disagree, O Judge," Terravan says. "I will cite further precedent. In the year 1139, Earth Reckoning, the Second Lateran Council, a duly authorized, although secular, governing body of the time, formally outlawed the crossbow as a weapon, forbidding its use except—and this goes to the heart of the matter—ex-

cept against the infidel. The term 'infidel' was understood to mean one who did not profess the accepted faith, in this case Christianity, one of the ancient religions. To be classified an infidel one did not need to reject the entire faith in its every tenet: the rejection of the smallest part of it would suffice. Clearly, therefore, an infidel was a heretic. And clearly the Eminence Fallett, in rejecting the official policy of this planetis, the Venusian deorbitizing, was heretical."

"And what of it?" the judge says. "If the Eminence was a heretic, he should have been brought to trial and duly macerated in the regular way. All this has nothing to do with the assassin Merefirs."

"Ah, but it does," Terravan says. "For, you see, if the weapon my despicable client used was one that might legally be used upon a heretic, then, in using it, he committed no illegal act!"

There is no sound in the courtroom. No one draws breath. The audacity of it! The sheer brilliance of the man! And now, seeing the balance tip, he presses on.

"I can cite further precedent," he says. "While the crossbow passed from general use as a military weapon after the Battle of Marignano, in 1515, E.R., it persisted as a hunting and target weapon, on Earth, well into the Twenty-first Century. And in the Twentieth Century, in one of the American principalities, called Usa, it was again outlawed, this time as a hunting weapon. In other words, it was forbidden to be used against animals, but, most significantly, not specifically forbidden to be used against men. I argue that this further strengthens my contention that, in killing the Eminence Fallett with a crossbow, the assassin Merefirs did not act illegally."

Dafton comes to his feet. "I too have studied the precedents," he says, "and I would point out to Terravan that it is not wholly true that the principality of Usa forbade the use of the crossbow against animals. In its final form, just before World War III, Usa consisted of fifty-two individual subdivisions, called states, and only fifty-one of them forbade the crossbow."

He sits, looking desperately pleased with himself.

The judge looks at him with obvious loathing. "You are a formidable antagonist in a court of law, Dafton," he says. "Terravan is no doubt terrified. But, nevertheless, perhaps he will be able to go on. You have more to say, Terravan?"

"I rest my case, O Judge," Terravan says.

"The court finds as follows," the judge says. "The Regional Eminence Fallett was a heretic. The assassin Merefirs killed him. But by his choice of weapon, Merefirs, standing upon the precedents cited by his counsel, is found not guilty of assassination, although he did assassinate. So much for that.

"Azulno, the common statutes of the planetis forbid disclosure by a civic servant of material made known to him in the course of his duty. To breach this statute is, upon the arguments and precedents here cited by Terravan, clearly heretical. Thus, Merefirs is a heretic. He should therefore be indicted upon that charge, tried and macerated. However, in the light of what we have learned today . . . Warder, do you understand the workings of this weapon, this crossbow?"

"Me, O Judge?" the bigger of the two warders says.

"You, idiot!" the judge says.

"Yes, O Judge, in a way I do understand how the thing works."

"Good. You may demonstrate," the judge says.

The warder takes the crossbow from the exhibition rack. He stands it on the floor, puts his right foot into the stirrup and his hands on the string.

"If it please the court," Merefirs says, "May I speak? The warder should put one hand on each side of the string, not both hands on the one side."

The warder changes his grip, pulls up with all strength until the string falls into its notch.

"Now," Merefirs says, "you lay the arrow—it is properly called a bolt, or a quarrel—into the groove, the blunt end tight against the string."

The warder does that.

"Stand across the room," the judge says, "and let us see if you can strike the assassin Merefirs in the middle of his chest. Have no fear. As Terravan has so convincingly proved to us, you will be committing no crime."

The warder lifts the crossbow, peers down the length of it. Suddenly, almost without a sound, the arrow, short and thick as your thumb, flies across the room, nearly faster than the eye can follow, and buries itself Thump! in Merefirs' gaudy chest. His chin drops. The violet light on the life-support box winks out. A yellow light comes on briefly, and then, the red. The second warder reaches up and flicks off the switches.

"Well done, Warder," the judge says. "Terravan, I congratulate you. You conducted a brilliant and original defense most successfully. Indeed, there is the mark of your success." He nods toward the body of the assassin Merefirs, still upright, a streak of blood leaking out of the black hole where the arrow has gone. "The gavel has fallen."

The bench drops silently to the floor. The judge stands.

"Terravan," he says, "let us take food together."

The warders trundle Merefirs down the aisle under the admiring eyes of the spectators. The miserable Dafton futilely shuffles his papers. The judge and Terravan go off arm in arm, happy as babes. Such is the nature of things. ■

THE REFERENCE LIBRARY

P. Schuyler Miller

INTELLECTUALLY SPEAKING

I think that old readers of this department have long since reached the conclusion that I am no intellectual. I have no intention of trying to define that abused designation. ("It takes one to know one.") I think I have some intellectual interests in archaeology and history, and a gut concern for conservation that isn't intellectual at all. (As with science fiction and fantasy, I merely know what I like.) However, my only formal indoctrination in English-language literature is forty-five years past, my knowledge of world literature is strictly accidental and sparse, and I do not approach the evaluation of science fiction in the mood and manner of a proper critic. It simply never would occur to me to find similarities to Carlyle, Henry Adams and Tacitus in R. A. Lafferty's "The Fall of Rome," a Doubleday book which may or may not be history, may or may not be fiction, and may or may not be fantasy.

This is the kind of question which appeals strongly to members of the Science Fiction Research Association, an organization which I have unduly neglected here, except peripherally. The SFRA is a spin-off of the professional organization of college (and some secondary school) teachers, the Modern Language Association. Since the MLA is a teachers' organization, it is quite naturally concerned with teaching various aspects of English literature. Since 1958, its definition of "literature" has included science fiction.

Since that year, at least, the program of the annual MLA conference has included a seminar on science fiction. In due course, the seminar gave birth to a magazine which publishes papers given at these seminars and elsewhere. (Let it be said that a goodly number of "old pro" SF writers, some of them with roots as remote and lowly as mine, are university teachers and teach courses dealing with science fiction and fantasy. Jack Williamson, who teaches at Eastern New Mexico University, lists 180 such courses in 115 colleges and universities and a number of high schools in the revised edition of his "Science Fiction in College"—75¢ from Mr. Williamson at Box 761, Portales, New Mexico 88130.)

The magazine, *Extrapolation,* is published twice a year by Dr. Thomas D. Clareson, Box 3186, College of Wooster, Wooster, Ohio 44691. You can subscribe for $3.00 a

year, $7.50 for two years, or get a sample issue for $1.00 from the above address. You will get it free, plus a monthly newsletter, if you spend $20 for a membership in the Science Fiction Research Association.

The SFRA's title means exactly what it says: research into science fiction. It's professional research, mainly—but such fanzines as *Riverside Quarterly* in Canada (which published Jack Williamson's doctoral dissertation on H. G. Wells), the late great *Science Fiction Review,* and others that I don't see, publish critical articles just as good as any the professors offer. Dr. Clareson included many of them in his anthology, "SF: The Other Side of Realism" (Bowling Green University Press, 1971), which I did report here, and abstracts others in his "Science Fiction Criticism" (Kent State University Press, 1972).

The SFRA takes part in the annual Secondary Universe conferences, which are to intellectual science fiction what the gigantic week-long assemblies of the American Association for the Advancement of Science ("Triple A S") are to science. I regret not announcing the fourth of these conferences, held last year in Toronto, or managing to attend it. I further regret failing to announce Secondary Universe V, which as you read this will have been held at Drake University, Des Moines, Iowa on October 6 through 9.

It makes an annual award, the Pilgrim Award, to the professional who, in the opinion of a jury, has made an outstanding contribution to the literature *about* science fiction. The award is named for the book which signaled to the intellectual world, back in 1947, that SF was a genre worth their time—"Pilgrims Through Space and Time" by Professor J. O. Bailey of the University of North Carolina. I imagine it is at least partly because of this upsurge of interest in science fiction as (to quote Dr. Clareson) "the latest development in a continuing literary tradition which may be traced at least to the Renaissance and the medieval travel books" that Greenwood Press of Westport, Connecticut has published a new edition of "Pilgrims"—$3.50 paperbound, $11.25 in cloth. The book is dated: it was finished in 1939, except for a tacked-on chapter; it deals only with books; but it is still *the* major scholarly history of the field.

Happily, Professor Bailey was able to accept the SFRA's first Pilgrim Award in 1970. At last year's Secondary Universe, it went to Marjorie Nicolson of (I think) Cornell, author of "Voyages to the Moon" (now a Macmillan paperback) and "Science and Imagination." The SFRA has a real problem in trying to honor these major scholars in the field "prehumously," while they can appreciate the appreciation.

You may ask—and if not, I'll ask for you—"Why twenty bucks?" Mainly because that is the scholarly

scale: check your nearest professional society. Faculty members may have their dues paid by their departments; they should, because they'll learn more, formally and informally, at a Secondary Universe gathering than in years in a library, or even in Sam Moskowitz' collection. If not, they can deduct the cost from income tax as a professional expense (so, I imagine, can some of the professional SF writers who helped found the Association). Laymen are simply going to have to decide whether it is worth the price of a few fifths (how do *I* know what you drink?) to help encourage and sponsor research, however fine-spun, into science fiction.

This has been a very thin account of what the SFRA is, does, and plans to do. Fred Lerner, 7 Amsterdam Avenue, Teaneck, N.J. 07666, who is or has been the treasurer of the Association (is, as of June), will be glad to tell you more. For a self-addressed envelope, he'll send you a copy of the SFRA *Newsletter,* which he edits, and which includes a good deal of news about scholarly activities, reviews, comments, and what have you. Right now he has started a series of abstracts of papers delivered at various meetings.

One last note. The SFRA's Committee on Library Resources, headed by H. W. Hall of 3608 Meadow Oaks Lane, Bryan, Texas 77801, is compiling a directory of science fiction and fantasy research collections in the United States and Canada. As of the April *Newsletter,* he had heard of or knew something about thirty-five such collections in the United States, four in Canada, and two in England. He would like to hear from anyone who knows or has used any of these collections, because the SFRA will eventually publish a directory of them.

In his spare time, Mr. Hall is also at work on a listing of Master's theses and Doctoral dissertations on SF and fantasy. He needs to know subject (title), institution, date the degree was granted, and any other pertinent information you can find.

And in what time he has left, Hal Hall is also compiler/editor/publisher of an annual "Science Fiction Book Review Index." The 1971 *Index* just came in: 33 pages, nicely lithoprinted and stapled with an attractive cover by Moffitt, for only $1.50. (Write to Mr. Hall at the address above.) I am honored that he has covered this department, but he also scours the shelves for reviews that are much more scholarly than mine. His first compilation, for 1970, is long out of print (there were only 400 copies), but he will have a Xerox copy made for you for $3.50, cash on the barrelhead.

THE WIND FROM THE SUN
By Arthur C. Clarke • Harcourt, Brace Jovanovich, New York • 1972 • 193 pp. • $5.95

This collection of Clarke's short fiction, his first in too many years, is an odd lot of superb stories and

trivia. In the first category I would certainly put his "A Meeting with Medusa," published early this year in *Playboy* with an illustration that should have been on the book jacket. Here he achieves some of the poetry of "City and the Stars" and "Childhood's End" in a story as realistic as any he has ever written, as his narrator explores the depths of Jupiter's fantastic atmosphere in a kind of dirigible balloon—a kind of atmospheric bathyscaphe.

Right up there with "Medusa" is an older story, "The Wind from the Sun," about the mechanics and logistics of space-sailing. It is "quantitative" science fiction of a kind that we hardly ever see any more. "Maelstrom II," in which a man gets into orbit around the moon, is another realization of celestial mechanics in a curiously calm melodrama. "The Shining Ones" takes us into Clarke's beloved deeps, off Ceylon, where—something—has destroyed the submarine end of a great power plant.

There are more. "The Cruel Sky" is antigravity among the Himalayas. "Transit of Earth" has a man marooned on Mars—the real Mars. "Dial F for Frankenstein" tells what happens when the interlocked worldwide telephone system reaches the complexity of a human brain.

The rest are gimmick stories, gag stories, fantasies, whims, fun enough but trivial in the company they're in. They'll read better in anthologies than they do here.

THE GODS THEMSELVES

By Isaac Asimov • Doubleday & Co., Garden City, N.Y. • 1972 • 288 pp. • $5.95

Boxing fans like to argue about what would happen if one of the old-time champs like Jack Dempsey were to take on one of the moderns. Well, the old champ of pre-Hugo science fiction has come into the ring slugging with his first novel in fifteen years (if you don't count the novelization of the script for the film, "Fantastic Voyage," which didn't even show much of Raquel Welch).

"Dr. A" has written a save-the-universe story with a difference . . . about an impossibility. It started out as a gimmick story: Robert Silverberg, in a convention panel, had spoken passingly of Plutonium 186—an element that is impossible (too unstable) in our universe. The Good Doctor promised to write a short story about the stuff, and wound up with three stories about three sets of characters, tied together by their common need to undo what "the gods" have wrought.

About that title: this is old-fashioned "hard" science fiction—not fantasy. The complete quotation from Schiller is: "Against stupidity the gods themselves contend in vain." All three sets of characters have stupidity to contend with, but Isaac is no pessimist—he ends his citation with a question mark.

The book has had one of the oddest serializations on record. Part I appeared in *Galaxy* early this year. Part

II was in *If*. Part III was back in *Galaxy*. To add to the confusion, a Science Fiction Book Club edition ($1.98 plus shipping charges) and a paperback may very well be out before you see this. Read whichever edition you can get your hands on.

The book begins like an Asimovian mystery when a lump of tungsten in a sealed bottle turns into the incredible Plutonium 186. One Dr. Frederick Hallam, the stupidity symbol of the first third of the book, stumbles into the discovery that "people" in a parallel para-universe with different physical laws from ours are somehow shoving the plutonium through the wall between the continua. The result is an "Electron Pump" that provides us with a seemingly endless supply of negative electricity and provides the para-people with positrons.

A few doubters reach the conclusion that the curvature of space-time is being homogenized in the two universes by this pumping process. At some time—and they think it will be soon—our laws will have changed enough so that the sun will become unstable and blow up. This part of the book describes their struggle against Hallam's stubbornness and stupidity—a devastating picture of academic in-fighting in Big Science and Big Education, which may draw on some of Dr. A's personal knowledge of such things.

The anti-Hallam faction has had messages from the para-universe, confirming their conclusion that the Electron Pump is dangerous. In Part II we see who sent them—one of the most fascinating lots of aliens we have seen in SF. They are trisexual—"male" individuals epitomizing rationality and the parental functions, physically and psychologically united by the "female" emotional. (What the "Libs" will do to Dr. A at his next convention I shudder to think!) The personalities of the three components of one triad, and the physical details of their society and species are beautifully worked out. The struggle of the Emotional Dua—a female who doesn't accept "her place"—against the inborn stupidity of her Parental, Tritt, parallels the Lamont-versus-Hallam struggle of the first part, with some important differences.

Among other things, it appears that the scientists of the para-universe are villains, not blunderers. They *want* to blow up our sun, and supply their fading world with illimitable energy for all time to come. In Part III, a human team on the Moon dedicates itself to saving the universe—both universes—all the universes. Another of the anti-Hallam physicists, self-exiled on the Moon, is drawn into the gambit of a lunar independence underground, which includes a girl Intuitive . . . one of those rare human *gestalt* synthesizers who can comprehend and "see" relationships that logical reasoners can't. This is the poorest part of the book, but it is good enough for most years. The whole proves that the Good

Doctor hasn't run dry, what with his one-man bookcase of nonfiction since "The Naked Sun."

This should be almost sure of a Hugo in Toronto next year. It might even get past the in-field of the Science Fiction Writers of America and win a Nebula.

THE CHAMELEON CORPS

By Ron Goulart • The Macmillan Company, New York • 1972 • 216 pp. • $5.95

This brings the Goulart freshet of early 1972 to the point of a catastrophic flood. Individually, the stories add a touch of refreshingly zany corn to any short story collection. In a repetitious mass, they are a mess.

As you should know, the Chameleon Corps stories—which I have enjoyed and will continue to enjoy singly—deal with events and societies on the myriad planets of the Barnum system, where whole nations and planetary societies are dedicated to the principle that there's another one born every minute, and if I don't get him, someone else will. The Corps is a sort of CIA made up of shapechangers. By a barely rationalized process (rationalized only by giving it a name), agent Ben Jolson can and does take almost any shape at a moment's notice. Here is where the gimmick becomes ridiculous: people and animals I'll give him, but when he turns into furniture it's too much!

Goulart has used the Barnum system worlds repeatedly, and often more creatively than he does here (and in some of the Chameleon Corps stories reprinted elsewhere—the better ones). The first five stories take place on Barnum itself (the headquarters world), multiprovincial Tarragon, Jaspar (where the teenagers are blowing themselves up), and Tartaruga. Not in this lot are the author's favorite Murdstone, where anything can happen, Peregrine, and Pedra. Jolson always wins, but not easily—and the obstacles make the fun, in reasonable quantities.

The other stories are a mixture of fantasy and nominal SF. In "Ignatz," the hero is doggedly trying to prevent the people of a California town from turning into cats when they want to. In "Subject to Change," the heroine turns into cats, chairs, whatever. "Please Stand By," novelette length, has occult detective Max Kearny involved with a friend who turns into an elephant at regular intervals. (It's the best in the book: you believe in Kearny.) "Shandy" is a cutie about a childhood toy that turns into things and finally woos the gal. "Change Over" is a Barnum system story, but not a Chameleon Corps yarn: Propaganda Corps agent Robert Carnivan must try to make King Umberto of Tartaruga behave himself. (This one offers a drug as the cause of the king's shapechanging.) Finally, "Looking Into It" stirs in a sizable dollop of Goulart's man-versus-machine formula, back on Earth in the world when things have either just fallen apart, or are about to.

BREED TO COME

By Andre Norton • Viking Press, New York • 1972 • 285 pp. • $4.95

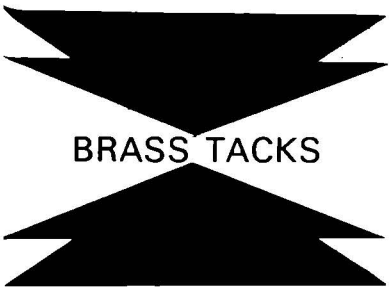
Reviewers, especially in the frequently merciless fanzines, have complained about the sameness of Andre Norton's plots. I have to agree, but she embroiders her stories with such marvelous detail that, to me, the bones of the plot don't really matter. To invoke a most inappropriate quotation, what matters in a Norton story is not who will do what and to whom, but how it is done. Younger readers seem to find this irrelevant.

Here we do, indeed, have "Norton Plot A" again, and not as cunningly embellished as sometimes in the past. It is the Ancient Ones theme: a planet has been dominated by a mysterious and powerful race, some time in the distant past. The Ancient Ones—the "Demons" in this case—have vanished into space or time, leaving the relics and ruins of their civilization to puzzle and enthrall those who eventually succeed them. The science of the past is almost magical to the people of the present; they struggle to use it without being used by it. And there is always the threat that the Ancient Ones may return.

Same plot again, but this time the planet is Earth, the Demons are ourselves, gone into space after war, pollution and madness have nearly shattered the race. The "People" whose fortunes we follow are the descendents of the laboratory cats on whom men experimented with genetic tinkering and selective breeding, so that their intelligence has expanded, their toes have grown into stubby fingers, and most of them live the kind of hunting-and-gathering existence that mankind lived before the development of agriculture. A few of the more evolved, led by the venerable and inquisitive Gammage (who predicts that the Demons will return) have moved into the ruins of an ancient city and are trying very hard to rediscover the secrets of the past.

Our hero, Furtig, a young warrior of Gammage's own line, is not quite good enough to win a mate in the tribal contests. He goes to the "lairs" in search of his near-mythical ancestor, finds him, and is shortly deeply involved in his research. There are rivals, the Rattons who consider themselves the Demons' true allies. There are possible allies in the fairly intelligent Barkers and the plodding Tuskers. There is savage warfare with the rats . . . discovery of new secrets and new powers of the cats' own . . . and finally the return of a scouting party of humans from another world.

Somehow, the Norton magic doesn't cast quite its usual glamor. The book is dedicated to her own People—her own cats—but it only rarely catches the spirit of catkind (something I've tried myself, and failed miserably to do; it isn't easy). I guess I feel that Andre Norton's place is among the stars and ages.



Dear Sir:

It seems fairly certain that Howard L. Myers wrote, and you published, "Out, Wit!" in your June 1972 issue to amuse and entertain the readers, and it does and will. But it does something more: it brings twinges of pain to this reader. This pain is old, from forty years ago.

It seems more than just likely that Mr. Myers is speaking from somebody's experience. For as I sat back and thought, after reading the story, I heard a soft breeze slowly become almost a hurricane. And as it passed over my house I heard the words, obviously from a number of old postgraduate students, "How true, how true!"

The rejection of possibly valid scientific ideas because they do not conform or because their propounders do not conform is real, and dangerous! And it may even contribute some, from within, to the "anti-science" propaganda.

JOHN E. GREGORY, M.D.
1060 Standingboy Court
Columbus, Georgia 31904

Remember Goddard's paper on rockets: "A Method of Reaching Extreme Altitudes"?

Dear Mr. Bova:

I read with more than a little amusement your philippic against the vast, ill-informed American public that distrusts intellectuals, for nothing is more well-founded than such a distrust.

Sociologists, psychiatrists, economists, T.V. network announcers, producers on the "public" broadcasting systems, members of the legal profession who are legislating us into a brave new world, advocates of the welfare state, haters of individualism, promoters of the socialist state, all of whom have an unequaled record of failure, are the "intellectuals," self-proclaimed and accepted as such by the estate to which you belong. If they all should be, as John Campbell stated, dumped in the ocean three miles offshore, the world would be the better for it.

Scientists and engineers have joined this motley mob, and *therefore* are distrusted . . .

If hard science people want to be respected they might try sticking to hard science. If they insist on being

considered "intellectuals," a label which I indignantly repulse, they can accept the consequence . . .

JACK KNEASS
No. 169 Rancho Del Rey
16222 Monterey Drive
Huntington Beach, California 92649

Obviously, you're defining "failure" and "intellectual" in your own way. But much of the world's current troubles could just as easily be blamed on the fact that our leaders are seldom "intellectuals." Indeed, being an egghead is a good way to lose an election!

Dear Mr. Bova:

I happen to share your "almost religious feeling" about manned space exploration, and your April editorial brings tears to my eyes—and laughter to my lips, for what is killing the space program is not anti-intellectual right-wingers but moderate and left-wing intellectuals.

Look through the various "journals of opinion" and see which ones are generally favorable to manned space: *The Economist, National Review, Fortune, The Wall Street Journal, The Objectivist,* and even *American Mercury.* With the possible exception of the latter, the readers of these publications are not particularly in favor of gunning down "pointy-head intellectuals and students" but they are obviously not part of the dominant cultural ethos.

What has been the reaction on the other side of the ideological spectrum? Overt hostility ranging down to lukewarm support for a non-manned space program depending on the extent of one's revolutionary purity—and that reaction has been fairly constant since 1961.

The reasons are complex; lack of "relevance" or hostility to a Military-Industrial Complex really don't seem all that important. What might be most important is that to have a "religious" feeling for space travel involves a tolerance (if not enthusiasm) for the technology which makes that enterprise possible, and if those are your feelings, you write for Analog rather than, say, *The New Republic,* or become an engineer. The trend is accentuated by the general liberal and radical distaste for technology. At any rate, the people who favor manned space programs tend to self-select themselves out of positions in which they might usefully promulgate their views.

There are some exceptions, of course, but I don't think they affect my thesis.

A secondary consideration is that nontechnically-inclined people are frequently told of the wonders of a hypothetical space program in terms which imply we'll be getting them for free. In this respect, popular articles by Asimov and Clarke may have done more harm than good—particularly so in that this "religion" needs an Elijah rather than a Maimonides.

Kelly Freas' idea is in the right direction, but is not apt to be conclusive by itself. Perhaps we science fiction readers ought to be writing more to our congressmen or newspa-

pers, or perhaps Sturgeon and Anderson should be writing for *Commentary* rather than *National Review* . . .

M. SHUPP
339 Marboro
Boston, Massachusetts 02115

There are anti-intellectuals on both the right and left wings—and in the center. In this era, to be ignorant of technology is far worse than being ignorant of history. And to be hostile toward technology per se *is about as sensible as being hostile toward your blood because it occasionally clots.*

Dear Mr. Bova:

I just finished reading "A Transatlantic Tunnel, Hurrah!"—the final installment of which appeared in the May issue.

My opinion is that this is a fine yarn—very poorly told.

For one thing, the dialogue is stilted and unnatural all the way through. Even the intimate conversation between Gus and Iris is stilted and formal, reminding the reader more of the stilted squibs that passed for letters in the Nineteenth Century than a conversation between what should certainly have been intimate friends.

The idea of having a nuclear submarine destroy itself because of a nuclear explosion of its reactor is very much overblown. As a matter of fact, a reactor will merely "slag out" if the controls are allowed to be removed. Perhaps the steam boiler might have exploded or something of that sort; but no reactor is capable of a nuclear explosion. This is a rather poor piece of propaganda against what is, in reality, one of the least offensive sources of energy.

Another slip in the writer's physics is his continual reference to apparent "compression" of water at great depths. Actually, according to elementary physics, water pressure at any depth is purely a matter of "head" or the actual weight of a column having the area of the space under consideration and a height equal to the depth of the water. There would be no real tendency to crush a submarine or any other object flat once it was ruptured. Rather, the tendency would be for no further damage to take place since pressures would be equalized inside and out. Oil is *slightly* compressible. Water is essentially noncompressible.

The basic idea of parallel time streams is excellent; and gives the author an opportunity to offer some very pertinent observations on the current scene. In this, he is following the same idea as Jonathan Swift followed many years ago in his "Gulliver's Travels." Often, political comment can be put more vividly in the form of fiction—and probably at the same time much more safely.

I particularly enjoyed the "Seance" scene where some brief glimpse of our own world is given with the comment that it is too horrible to contemplate and thus probably a figment of the medium's imagination.

The idea of a coal-fired turbine engine as used on the super-sized air liner is intriguing. It *would* work! Only thought is: what about the abrasive effect of coal ash on the bearings? I noted with interest that a "sister ship" except for being revamped as a military weapon is driven by steam turbines rather than the internal combustion turbines used on the commercial air ship. Doesn't seem to me as if that would be a real "sister ship." Too, it would seem that the loss of efficiency would cause the *military* rather than the commercial ship to be the one to use the internal combustion turbines.

In spite of its many faults, "A Transatlantic Tunnel, Hurrah!" was good entertainment—and that's the main purpose of *any* yarn!

DAVID A. KING
94 Beacon Avenue
Layton, Utah 84041

"A Transatlantic Tunnel, Hurrah!" is many things, including a parody of the Victorian "scientific romance" that predates H. G. Wells. Hence the "stilted"—and humorous!—dialogue.

Dear Mr. Bova:

A few months ago I visited Mrs. Lester Dent at her home in LaPlata, Missouri. You may recall that her late husband wrote the "Doc Savage" stories for Street & Smith under the byline of Kenneth Robeson.

I was distressed to learn that Mrs. Dent doesn't have a complete file of "Doc Savage" magazines. She's been trying for years to find back issues, but without success. I managed to locate some of them, but she still needs the following issues:

1942—September, October, November
1943—February, March, June, July, September, October, December
1944—December
1945—March
1947—February

The thought occurred to me that you might be able to help this gracious lady by printing this in Analog's letter column. She is willing to buy or trade earlier issues for what she needs. She can be reached directly at this address: Mrs. Lester Dent, LaPlata, Missouri 63549.

JACK CORDES
517 East Melbourne
Peoria, Illinois 61603

Dear Ben:

I have several criticisms of your editorial concerning the death of the cities. It seems unlikely that the neo-barbarians of your future cities would (or could) launch an effective outbreak, even if armed with small automatic weapons. The suburbanites would control all the supplies. Nor do I think that the city people could develop a sense of unity adequate to launch any sort of even mildly effective invasion. Another objection that I have to your projection is that it ignores any other attraction the city offers besides that of a convenient gathering place for economic activities. The city offers

certain stimulations that cannot be conveyed by electronic communications. Doubtless this attraction will not stop a further disintegration; however, I do think that the disintegration will stop before it reaches the stage where it will only be occupied by the unemployable.

MATT HICKMAN
708 20th Street
West Des Moines, Iowa 50265

Nobody really wants *the cities to wither, but they're withering just the same. And the street gangs of yesterday are forming up into stronger, more ambitious groups that are already beginning to police their own neighborhoods, in their own way. Many kids have been taken off the narcotics hook by such groups of their peers. And many pushers have been not-so-gently persuaded to ply their junk elsewhere. If the cities deteriorate much further, these street vigilantes are going to form small armies—and they'll be armed well enough to handle anything short of Regular Army. Now, since most of the "grunts" in the Regular Army come from the same segment of society. . . !*

Dear Sir:

Having *once* been an anarchist, avowed and fully indoctrinated, I naturally felt compelled to read Larry Niven's "Cloak of Anarchy" as soon as I opened the magazine.

As the story unfolded, I kept my fingers crossed with the hope that the author would present something other than a *fait accompli* argument against anarchy. (It would be too much to expect an argument as to the plausibility of anarchy as an alternative system.) My crossed fingers curled into a tight fist of frustration.

I have come to believe that it takes an extremely odd mind to understand anarchy—let alone to conceive of it as being feasible. Bertrand Russell understood but considered anarchy impractical because of the way people are now (not because of the way things *ever* could be).

A. E. Van Vogt proposed a system of anarchy for those who were not "unsane" ("World of Null-A" and "The Pawns of Null-A").

I do not think Mr. Niven was arguing that anarchy was infeasible because of the way things are now *or* the way they will be in the near future in Los Angeles. No. He was arguing that anarchy was infeasible—period. Without presenting why I consider that this is so, I simply contend that it is more important to suggest what criteria must be met for anarchy to exist than to suggest under what conditions (or frames of mind) anarchy cannot.

Thus I see his story as giving less evidence for the failure of anarchy as a system and more an emotional reaction against it.

ROBERT CLARK
Ottawa, Ontario,
Canada

To make anarchy work, you must undo some fifty million years of mammalian evolution.

LEGALIZE POT?

continued from page 7

as an aid in getting patients to withdraw from stronger drugs. The first recorded use of marijuana medically dates back to 2737 B.C., in China. The Western World discovered marijuana in the more recent centuries of empire-building. In 1839 an Irish physician serving in India, W. B. O'Shaughnessy, published the first scientific paper on marijuana. He found that the drug did not seem to harm mice, rats or rabbits. He also used himself as an experimental animal and found no ill effects.

European physicians used marijuana as a medicine until early in the Twentieth Century, when the hypodermic syringe came into use. Marijuana doesn't dissolve in water easily, but the stronger opiates do, so today physicians use opium-derived drugs for relief of pain, sleep inducement, et cetera. Marijuana is a much milder and safer drug. The safety factor in a drug is the difference between a dose that does the intended job (easing pain, for example) and a dose that is lethal. On that basis, marijuana has a safety factor about a thousand times better than Secanol, a widely-prescribed sleeping pill.

The effect of marijuana on human behavior is less well-known. Strangely, up until the late 1960's there were practically no scientific studies of marijuana's effects on behavior. The two earliest papers written were done in 1933 and 1944, one on a test group of soldiers in Panama, and the other on a group of prison inmates. (The second study was done by none other than Fiorello La Guardia, the multi-talented mayor of New York. It was roundly attacked by the medical profession.) No adverse effects were found in either study; the most damaging thing that could be laid to the drug was a lowering of the subjects' inhibitions—somewhat the same effect that alcohol produces.

In 1968 Andrew Weil and his colleagues, in Boston, published the results of the first known study of marijuana that used ordinary people from everyday walks of life, and included scientific controls. He found that the high produced by smoking "pot" depends more on the subject's emotional condition than the amount of TCH he inhales. Half of the volunteers were given real "joints" while the other half were given placebos—cigarettes with no marijuana. Neither group knew which they were getting. Some of the placebo smokers got high, some of the pot smokers didn't. Again, this is much like the effect of alcohol, where the drinker's emotional state is a strong factor in how high he gets on a given amount of alcohol. Some people can get drunk on no alcohol at all, just the suggestion. Apparently the same phenomenon applies to marijuana.

The long-term effects of marijuana, including the possibilities of

brain damage and malformations of unborn children, are even less clear at this stage of knowledge. There is some evidence that marijuana is less likely to cause birth defects than other drugs—including aspirin!

One thing does appear to be medically certain: marijuana is not physically addictive. There are no physical withdrawal symptoms when a person stops using the drug. And there is no evidence that smoking pot leads to a physical need for stronger drugs.

In summary, while all drugs have various physical and behavioral effects on people, marijuana seems to be much milder and in many ways safer than many of the drugs now routinely handed out by physicians and pharmacists. The long-term effects aren't clearly understood, but the same can be said for almost any drug. Medical research simply hasn't established the long-term effects of most drugs, from the anabolic steroids that athletes take to build up their muscle strength, to the tranquilizers and diet pills that fill most of the medicine cabinets in the nation.

That's the known scientific side of the marijuana question.

To decide on the legalization of pot, though, the scientific evidence is only half the argument. The other half includes the social, economic and moral issues. But these can be decided meaningfully *only when the scientific evidence is clearly understood.*

As long as marijuana is illegal, it will be expensive and it will be sold by the same people who have a vested interest in pushing the stronger drugs, including heroin. If the effects of pot are similar to those of alcohol, there would seem to be ample precedent for allowing its use, under state control. And drawing the parallel with alcohol one step closer, history shows that Prohibition not only didn't stop Americans from drinking booze, it made organized crime a big business. The strong laws against possession of marijuana haven't stopped people from smoking it. Those laws were written on the assumption that marijuana is harmful. If this is not true, then those laws should be changed.

It would be interesting to see an open debate on the marijuana issue, following the lines that Kantrowitz has suggested for judging scientific issues. The scientific evidence could be laid before the public and judged by a panel of experts picked from among the leading medical and chemical researchers and practitioners. Then the political, economic, social and moral questions can be debated—against the background of the agreed-upon scientific judgments.

Only then will we get as much light as heat out of the marijuana issue. Only then can the question of legalizing pot be settled rationally. Until then, the argument will rage on, with an extremely low signal-to-noise ratio. THE EDITOR

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