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Destinies

Edited by JAMES BAEN

THE SCIENCE FICTION MAGAZINE

ALL NEW!

FEATURING:

ROBERT A.
HEINLEIN

GREGORY BENFORD

JAMES GUNN

FREDERIK POHL

JERRY POURNELLE

CHARLES SHEFFIELD

G. HARRY STINE



THE HAPPY DAYS AHEAD

That's the title of Robert Heinlein's featured contribution to this the Fall Issue of *Destinies*: seventy pages about America's destiny, of which Mr. Heinlein says "I can risk great gloom . . . because I'll play you out with music at the end." All of this is previously unpublished, of course, but if upon finishing it you find yourself with a raging thirst for more of the wit and wisdom of RAH, another 520 pages will be awaiting you on November 1st, 1980, when Grosset & Dunlap publishes the hard-cover edition of EXPANDED UNIVERSE, from which "The Happy Days Ahead" was excerpted. Early next year Ace will publish the large-format paperback edition.

Mr. Heinlein's contribution alone would justify the price of admission, but did we stint on that account? We did not. We have stories and articles by Gregory Berford, David Drake, Dean Ing, Joe Haldeman, Frederik Pohl, Jerry Pournelle, Fred Saberhagen, Norman Spinrad, G. Harry Stine, and Richard Wilson. As well as the finest of science fiction, this issue as usual includes science fact like you can't get anywhere else: the same subject area as the new science slicks, but with intellectual depth.

This time Jerry Pournelle leads off the non-fiction by describing a recent NASA study in which he participated. What will astound you even more than what we are capable of technologically is what we are incapable

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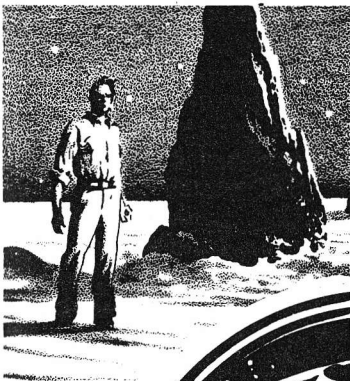
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Destinies



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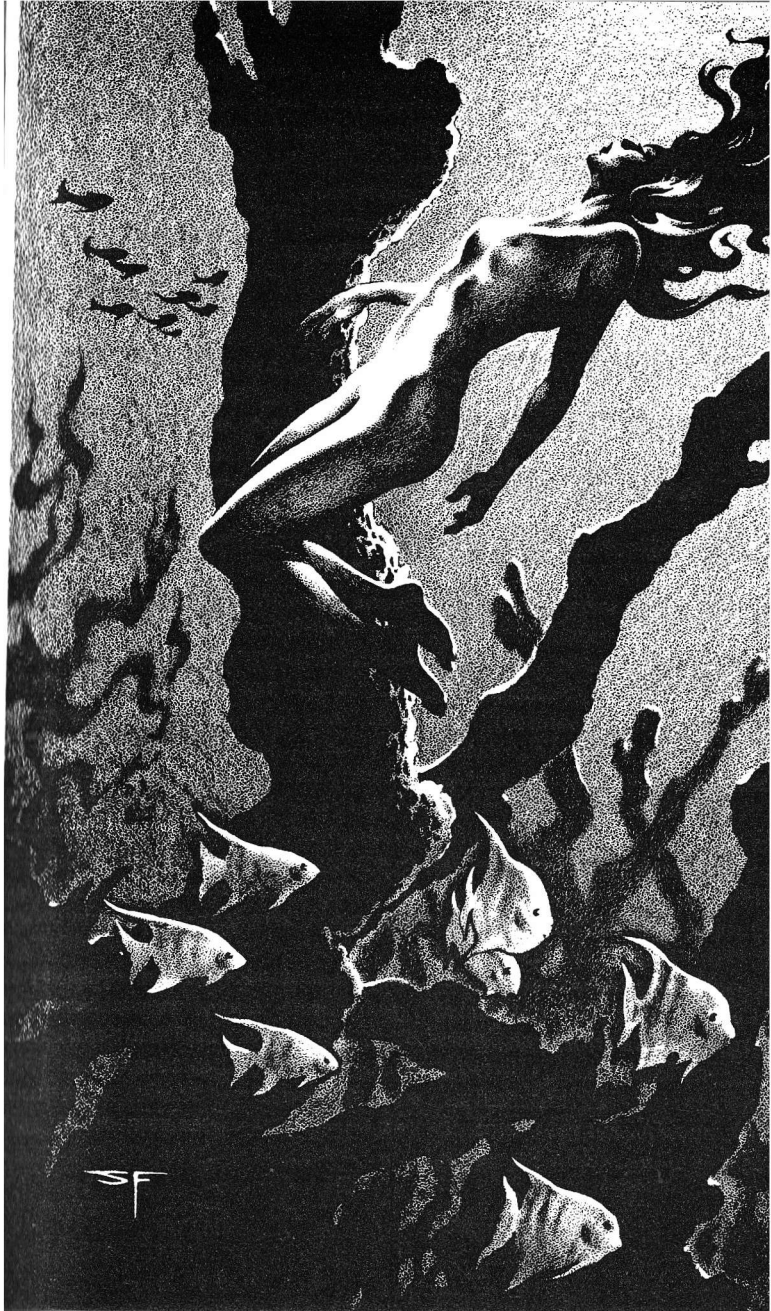
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RECESSIONAL

by Fred Saberhagen

Though reality shifted like
sand beneath his fleeing feet,
he could not escape the Truth.



From the window of his high hotel room, sixty dollars a day at convention rates, he could look between other buildings to see a small piece of the ocean. Within the mirror where he looked when shaving there was another window with another square of sea, and an hourly newscast came on that morning just as he was starting to shave. Razor in hand he listened while the voice of the woman announcer went through a few details of what she called the grisly discovery. The thing somehow got to him, enough to keep him from concentrating properly either on shaving or on what he ought to say when he appeared on the panel in a couple of hours. Not only that, it stayed with him after he finished getting ready and left the room.

The radio really hadn't given many facts. The body of a woman of indeterminate age had been washed up on a beach somewhere down in the Keys, which put it, he supposed, almost a hundred miles to the southwest of Miami Beach. An unnamed authority was quoted to the effect that the body might have been in the water as long as several years. He thought at first that the newscaster had probably got that garbled somehow, but then mention was made of pockets of cold, uncirculating water to be found in certain depths, in which unusual preservative action could be expected.

One reason for the grisly discovery remaining with him all morning, he supposed, was that his panel topic was "Science in Science Fiction," and he hoped to be able to work that "unusual preservative action" into what he had to say. He felt a little uncomfortable about this panel, as he really was no scientist, though

he read the professional journals fairly often and popularizations a lot, and his stories tended to be thick with scientific jargon. He thought some of the readers liked the jargon better than the stories, and he loved it himself, really, which was why long ago he had begun to use so much of it. For him it had always made a kind of poetry.

Some of the other people on the panel were not only real scientists, but were writers as well. They talked quantum mechanics. They talked epistemology. He wasn't sure at first that he remembered what that meant. He wondered for a little while if he was going to have to sit there like a dummy for long minutes at a time. So as soon as the chance came, he got in a few words that shifted the subject to alternate universes. Anybody could talk about that.

Suppose, he thought to himself, looking out over the heads of the audience in the far last row while some argument between two other panelists droned on, just suppose that body could have been five years in the sea. How far could a body drift in five years? Well, certainly not through the Panama Canal. When, in the early afternoon, he got back to his room, he looked out at what little he could see of the one great ocean that went all the way around the world, and thought about that body again. They hadn't said what, if anything, the woman had been wearing. He couldn't quite shake the subject, it seemed to have set up a resonance of some kind inside his head. Time passed, what seemed like a lot of time as he sat waiting in his room, but the phone call from another hotel room that he was expecting failed to come.

So he left the convention earlier than he had planned, left it that very afternoon, driving north through summer Florida. Going to the convention, he told himself, had been more trouble than it was worth. In the old days, the cons ran three days, no more, and were relaxed and friendly. Now each one he went to seemed like some damned big business in itself. Just getting away on his own was something of a relief.

A day and a half later, waking up early in his motel room in Atlanta, he put in a call to his agent in New York. The agent would be back in the office in half an hour, the girl thought, and would call him back then. Waiting for the agent to call back, he took a shower, and when he came out of the shower, dripping, turned on the radio.

Listening, he experienced an inward chill.

"... thought to have been in her early twenties, recovered from the Cattahoochie some twenty miles north of Atlanta. The condition of the body made it impossible to determine immediately if there were any marks of violence. Sheriff's officers said that the body might have been in the water for as long as several months. Attempts at identification :. ."

The phone rang. It was the agent, for once communicating even earlier than expected. And with good news: money was coming through, even more money than they had been looking for, and he could afford a trip, a wander across the country, if he felt like one. He hadn't really felt like one for several years, not since he had been living alone, but he felt like one now, before he went home and got back to work. Not that New York or any place else was really home. He had reached the stage of being down to mailing addresses.

The Interstate impelled him west. He liked driving his car, he usually liked machines. Quantum mechanics. Epistemology. That was what they talked

about on panels nowadays. In the old days they had talked about relativity sometimes, but then you could figure that almost no one knew what they were talking about. He should have taken the time, before coming to the convention, to read up a little more on current work. That way he could have at least sounded a little more intelligent. He would settle in for a day or two of reading when he got home.

A feeling was growing in him that the convention he had just left had marked some kind of turning point, a new departure in his life. Something had changed. Whether it was for better or worse had yet to be discovered. For richer, for poorer. He was never going to get married again, that much he felt pretty sure about, not even when his status as a widower became finally and fully legal and official, as one of these years it would. Was it two years now, or three? Conventions were still good for providing a little fun in bed, and that was all he needed. Then next day he waited in his room and the phone refused to ring as scheduled. Well, maybe it was just as well.

He didn't really know where he was driving now, he just wanted to get off for a few days. On a new course. Alternate universe. When he had brought up that hoary old science fiction concept on the panel, one of the real scientists, almost condescending though he was trying not to sound that way, had admitted aloud that some experiments in particle physics carried out within the last ten years even suggest that physical reality may depend in some sense, to some extent, on human consciousness. If that was true, the writer had thought, listening, if that could be true, how was it possible for everybody to remain so calm about it? But thus spake a real life quantum mechanic. The Bell inequality, whatever the hell that was. The spin of elementary particles . . .

The car radio assured him that gas supplies were good everywhere across the country, though prices

showed no sign of coming down. Tourist business was suffering. He was going to have no trouble finding a motel room, wherever he went.

At Birmingham he decided to head on west for a while, and stayed with Interstate 20 going southwest to Jackson. Hell of a country to be driving through in the summer in search of fun or relaxation. But the car was nicely air conditioned, a space capsule whose interior guarded its own sounds and atmosphere, keeping noise and dust and rain and heat all nicely sealed outside. What showed on the windows could almost be no more than pictures from outside, computer presentations.

In Vicksburg he located a bottle of bourbon and took it to bed with him. A lot less trouble than a woman. But then to his own surprise he discovered that he didn't feel like drinking much, even after the long drive. He took a couple of sips, then let the bottle sit. He turned on the television, got some local talk show. Talk shows were usually his favorite, they provided humanity at just about the right distance. They proved that the human race was still around somewhere, alive, not too terribly far away. But when you wanted, you could turn them off.

"... for your research at the battlefield cemeteries?" the host was asking.

"Well, the opportunity came about because of some new road construction in the park." The speaker was a well-dressed man in the prime of life, mustached, relaxed, superior. He enjoyed talking like this. He was reminiscent of some of the people on the convention panel. "In the process of excavation for the road, some previously unknown 1863 military burials came to light, and we applied for permission to use some of the skulls in our tests, the same kind of tests we had been developing for the archaeological work on Indian sites. There were twenty-seven of the Civil War skulls altogether, all completely uniden-

tified. We think they were divided about evenly between Union and Confederate."

"And you got the same results with these, as with the older subjects, that had been in the ground for maybe thousands of years?"

"Better, in many cases. The bone frequently was much better preserved than in the older specimens. We were able to get some very interesting results indeed. The trace elements in the bone that resonate with the NMR . . ."

Jargon, of any scientific field, could still soothe him like poetry. Better than poetry. He sipped at his bottle and set it back on the table and got ready to drift toward sleep.

"... beauty of the whole thing, you see, is that the visual cortex of the brain need not be intact, or even present."

"That's the real discovery, then."

"That's part of it. Apparently what no one had suspected all along was that the hard bone of the skull itself has another purpose besides that of mere protection."

They had him drifting toward wakefulness again. Why hadn't he heard anything about any of this before? It sounded revolutionary. He wanted to hear it now.

"... bone perhaps serves as a kind of backup memory storage system, at least in human skulls. We don't know yet if it works the same way in other mammals."

"Then there should be applications of this outside the field of archaeology, wouldn't you say?"

"Oh, yes, definitely. Police work, for instance. Medicine. X-rays will still have their place, of course. But in medicine the NMR is soon going to replace the X-ray for most purposes, because it doesn't involve ionizing radiation; X-ray always presents some element of risk. Anyway, a police laboratory, say, can set

up an unidentified skull and obtain from it images of scenes that the person actually saw when alive."

"That's spooky. Would you get, maybe, the last thing they saw before they died? Wasn't there some nineteenth-century theory that by photographing a dead person's eyes the image of the last thing they saw in life could be recovered?"

"Yes. There's a Kappling short story about it. But that's all sheer superstition. This is something entirely different."

Not *Kappling*, you numbskull, you mean Kipling. But the word had been so clear and deliberate. Some affected pronunciation? Some in-joke? No one was laughing.

"... a thing like this to be acceptable as legal evidence, I wonder."

"I'm no lawyer, but I do know that police all over the country are already trying it out. I think that sooner or later it's bound to be accepted fully. The weight of accumulated evidence is going to silence the objections."

"What objections are there? If you can obtain a good picture, as you say you can, doesn't that prove you're right?"

"Well, a few pretty bright people were worried, at first, when they realized what we were doing. There were arguments that what we were doing could start to unravel the whole fabric of physical reality. There's a kind of resonance factor operating, and the more people you have doing similar experiments—especially on similar subjects—the more likely it seems to be that there will be a concentration, a focusing of the effects of many separate experiments upon one subject."

"How can that be?"

"We don't know. But if reality can depend in some sense upon human consciousness, then maybe the existence, the form, of an individual human con-

sciousness depends also upon the reality surrounding it. Or the realities, if you prefer."

"You said there was no harmful radiation, though."

"Right. All the physical objections have now been pretty well taken care of. The main objection now is to the fact that our best pictures are partially subjective. That is, we obtain the best readings from a human skull when we use another skull, the observer's own, as a kind of resonator."

"The observer's own skull? Give me that again, will you?"

"All right." But there ensued a thoughtful pause. The scientist chewed his mustache.

The host, avoiding dead air time if nothing else, interjected: "With NMR you *do* project waves of some kind into the body, into whatever's being examined—?"

"Yes. NMR scans are a proven means of probing inside matter. They've been used now for thirty years."

"And, tell me again, NMR stands for—?"

"Nuclear magnetic resonance. All that we actually project into the body, the specimen, or whatever, is a strong magnetic field. This causes the nuclei of certain atoms inside the specimen to line up in certain ways. Then, when the imposed field is removed, the nuclei flip back again. When a nucleus flips back it emits a trace of radiation that registers on our detectors, and from all these traces our computer can form a picture."

"No harmful radiation, though."

The scientist smiled. "Do you have a sort of a *thing* about radiation?"

"Most people do, these days."

"Well, no, it's not harmful. Now what we've discovered is that when the observer's own skull is used as a kind of magnetic resonator, then pictures, im-



ages, are actually induced in the observer's own visual cortex. He sees a finer, sharper version of what the computer can otherwise extract from the specimen and put up on a stage in the form of a holographic projection. But we can't yet repeat the results as consistently as we'd like. When you scan a specimen skull more than once, you're likely to get a different picture every time. So the question is, is what the human experimenter claims to see really the same as the blurry picture that the computer puts up on the hologram stage?"

"I wish you could have brought some pictures along to show our audience."

"By the time I photographed the hologram, and then you ran it through your cameras and so on here, onto their sets at home, they would be seeing a picture of a picture of a not very good picture."

"Maybe next time?"

"Maybe next time. But as I say, it's not really all that informative when the first image is blurry."

"And you can't get the same picture twice?"

"The structure of the skull, the specimen, is changed minutely by the very act of reading it. There are various interpretations of why and how this whole thing works at all. It surprised the hell out of a lot of us when we first began to realize what was happening. And even worried a few people, as I say: can time and space become unraveled? Do we tend to get different readings each time because we are reaching for similar atoms, similar skulls, in adjoining universes? The theoretical physicists think it has to do with coupling through electron spin resonance, that's ESR. The ligand field of each particle expands indefinitely, they say now, which is going to open up a whole new field of research."

"Superhyperfine splitting," commented the host, nodding sagely, and got a laugh in the studio. He was obviously harking back to something that had earlier

snowed him and the audience as well.

The scientist shook his head and smiled tolerantly. He murmured something that was lost in the subsiding laughter.

"I see," added the host. He continued to nod in a way that meant he had given up on trying to see, especially after that ligand field. "But do you think you'd be able to help the police discover, for instance, who this young woman is whose body came down the Mississippi today? They say she might have been in the water for several weeks. Wearing a yellow bikini and—"

His jerking hand at last found the right switch on the unfamiliar set. The picture died, in an erratically shrinking white dot-spark, that lashed about for a moment as if trying to escape its glassy prison.

The departure of the voices left a hollowness in the air of the dark motel room. Other murmurings came in from other rooms not far away. The carpet under his knees felt rough and dusty. He might have just got up calmly and walked over to the set to turn it off, if he wanted it off. But there had been a bad moment there, bad enough to make him lunge and crawl.

He stood up, stiffly. On the bedside table the bottle waited, hardly started. No. He was all right. No, just a moment of panic there, such as sometimes came when he was drifting off to sleep. He had thought that at last, after months of learning to sleep alone again, he was all through with midnight panics. Just one small sip now, and even without that he was tired enough to sleep. Then, tomorrow, he would drive again. He could drive anywhere he wanted to. Things were all right . . .

In the morning he knew that he was not going to follow the great river north, up to the great lakes. Yesterday the plan in the back of his mind, as well as he could remember it, had been to do something along that line. But enough of water, and watery

places. He would go on west, and put the big rivers and the lakes behind him.

In Shereveport he sat in a plastic booth, eating plastic-tasting food, and abruptly realizing that in the booth next to him sat two state police officers. Whether it was more nearly impossible that they had already been there, unseen by him, when he sat down, or that they had walked in past him without his knowing it, he couldn't estimate.

"... she mighta been from way upstream somewhere. The Doc, he says days in the water. White gal. Just a lil ol bathing suit on. No wounds, nothing like that."

"Well, the Red can be worse'n the Mississippi even, when it rains enough. It's been like pourin' piss out'n a boot up there in Oklahoma."

Back in his car, moving on the highway, he realized that somehow he must have paid the restaurant cashier. Otherwise the two state troopers would already be in hot pursuit.

Fifty-five was the law, and maybe in some places they cared about that. But once he got to Texas he felt sure that nobody was going to give a damn. He opened her up.

Greenery and rivers dried up and blew away in the hot wind of his passage. Signs indicated where to turn to get to Midland, Odessa, Corsicana. Nazareth. If a name existed in the universe, if a name was even conceivable, and maybe sometimes if it was not, it could be found somewhere in the vastness of Texas, applied to a small town.

He slept in a motel somewhere, in a room where he turned on no radio or television. And sometime after that he crossed a border that lay invisibly athwart the unfamiliar lunar landscape and found that he was in New Mexico. Maybe he had never come exactly this way before. He couldn't remember things being quite this barren even here.

Signs told him he was nearing Carlsbad. The highway topped a stark rise to disclose an unexpected wall of greenery waiting for him, not far ahead. Pecos River, a small sign added. He drove across a highway bridge over the river, which was for this part of the country so wide and full that he was astonished by it until he saw the dam.

If he tried to go any farther tonight he was going to drive right off the road somewhere in exhaustion. And yet, once settled in the Carlsbad Motel, he couldn't sleep. He had to know first what was happening. No, not quite right. He had to know if he was going to have to admit to himself that something was happening. Maybe he was just going a little crazy from being alone too much in summer heat. If that was all, he should just stay in one cool room for a day and a night and sleep.

He forced himself to turn on the ten pm television news, and he listened to the whole half hour attentively, and there was not a word about drowned bodies anywhere. He started to relax, to feel that whatever had started to happen to him was over. When the news was over, he found a talk show, on another channel that came in by cable from the west coast. Show biz people and famous lawyers sat around a table. During the first commercial he roused himself and went out to get half a pint of good bourbon. To hell with being so careful, you could probably drive yourself crazy that way. Tonight he was going to drink. He had the feeling that things were going to be all right after all.

He thought he had turned off the television set, but the voices were busy when he came back with the whisky. The same host, but evidently a new segment of the show, for the guests were different.

The scientist had no mustache, but he was certainly a scientist, and he even looked a little like that one on the other show. Well-entrenched in the world

and imperturbable.

"... from Cal Tech, going to talk with us a little about nuclear physics, quantum mechanics, the nature of reality, all kinds of good stuff like that there." Laughter in the studio followed, febrile and feeble at the same time, predictable as the outcome of a lab demonstration.

"The nature of reality," said another panelist. "You left that out." But it hadn't been left out. Didn't they even listen to each other's words?

Someone else on the panel said something else, and they all laughed again.

"Speaking of reality, we'll be right back, after this."

The cable brought in a good many channels. Here was Atlanta. Who knew where they all came from? But he knew that he would have to switch back.

"... pretty well accepted now by everyone in the field that it can't have any effect on the general perception of reality, what people generally experience as reality, no matter how many of these experiments you have going on around the world at the same time, or how many of them are concentrated on the same type of subject. The concentration effect, if there is one, sort of goes off somewhere; we can't even trace where it goes."

"You're saying that in effect you fire a volley off over the fields ..."

"... and it could possibly hit someone, but the chance is very small."

"Endor, did you say a moment ago?"

"The Witch of Endor?" another guest put in, archly, oh they were sharp out there on the coast, and there was more reflexive laughter, from people who recognized their cue, even if they didn't know what they were laughing about.

"ENDOR is an acronym," the scientist with no mustache was explaining, "for Electron-nuclear

double resonance. You see, it seems now that resonance is set up not only in the real atoms but in virtual atomic particles in nearby time-frames. The implications are enormous. Someday, theoretically, we could each have our own personal universe to carry around with us, tuned to our own skulls, our own perceptions. The original idea was only to measure the hyperfine . . ."

Flying a little high on bourbon now, and getting doses of jargon like that one, he needed only a few more sips from the bottle before he drifted off. To wake up, as it seemed, almost at once, with daylight coming in around the motel drapes. The air conditioner was humming already, the television had somehow been turned off. He lay there feeling better than he had dared to expect. Jargon is the thing, he thought. Jargon is definitely in. Where the hell have I been the last few days, anyway? But it seemed to be over now, whatever it had been.

He thought: I'm going to have to try to get on some talk show myself.

Taking his time in the warm morning, he listened without much apprehension to what scraps of news the radio was willing to give up. No drowned bodies anywhere. He went out and breakfasted. As far as he could tell from looking out across the landscape away from town, he might still have been in Texas. But in town there were trees, and lawns, though the grass when he looked at it closely was of an unfamiliar variety.

Driving away from the motel, he was still unsure about whether to head north, east, or west. South—Mexico—he didn't want. On impulse he drove a couple of blocks toward the massed trees, the river. Above the dam it looked like an eastern river, wide and full and slow-moving, and there for some distance the banks were lined with expensive-looking houses. There was the sound of a motorboat, and in a

moment a crack in the green wall showed a skier passing on the brown water. Nearby was a city park; he entered and drove through it slowly. There was a small sand beach, already in use in the day's heat.

There was also a police car, and a small but steadily growing crowd, fed by running children who were not interested just now in swimming. Between the standing bodies he caught a single glimpse of brown hair, yellow cloth. Bare, tanned arms being worked up and down by arms in blue policeman's sleeves.

He remembered to gas up the car and have the oil checked before heading on west. He was worried. But somehow he didn't seem to be as worried as he ought to be. He had the feeling that he was forgetting, putting behind him, a log, an awful lot of recent happenings. Nothing essential, though. Excess baggage. Part of the feeling of strangeness was no doubt due to the fact that he was just coming out of a bad time. Even if he hadn't been on good terms with her lately, it was only to be expected that such a loss would leave him in a shocked condition for several weeks. But he was starting to come out of it now.

Later that day, he was almost at Tucson where he realized where he was going.

At home in San Diego, he watched the sun go down into the one great ocean, just as once, long ago, he had watched it rise. On the Atlantic horizon, he could remember, there had been pink-gray nothingness, and then, instantly out of nowhere, a spark. Now at the last instant of sunset the shrinking sun became what looked like that identical same, long-remembered spark. And then, then night.

This house was his, this house right on the beach, only a hundred feet from water at high tide. Decades ago his parents had first rented then bought it, and he had hung onto it as an investment. This afternoon as soon as he got into town he had driven past the place on an impulse. It had looked unoccupied, though he

had been sure that it was rented. He was going to have to talk to the agent about that in the morning.

The place had looked completely deserted from the outside, but when he had let himself in with the key he always kept, it was hard to be sure whether it was currently being lived in or not. There were furnishings, not all of them unfamiliar. Pictures on the walls, some of which he could remember.

He turned on a couple of lights after watching the sunset. A little food in the kitchen cabinets, a little in the refrigerator. As if some people might just have moved out, not bothering to take everything or use it up.

He went out again, through the French windows, to sit in a lawn chair on the patio overlooking the sea. The ocean, never quite silent, was now almost invisible in the gathering darkness. The smell of it brought back to him no memories that were peculiar to this place. He had looked at and smelled the sea in too many other, different places for that. The one great ocean that went on and on.

Through low clouds there came suddenly the half-familiar, half-surprising sound of a slow Navy plane from the air station not far away. One of the search and rescue craft, and it sounded like it was heading out. Would they commence a search at night? That seemed unlikely, but there were always new devices, new techniques. Anyway, they wouldn't be using a plane to look for her, she hadn't gone out in a boat. And if they hadn't started to look for her last night, when she walked out, they wouldn't be starting now.

He paused, trying to clear his thoughts. How could they have started any search last night? He still, up to this minute, hadn't told anyone how she had gone. Not yet . . .

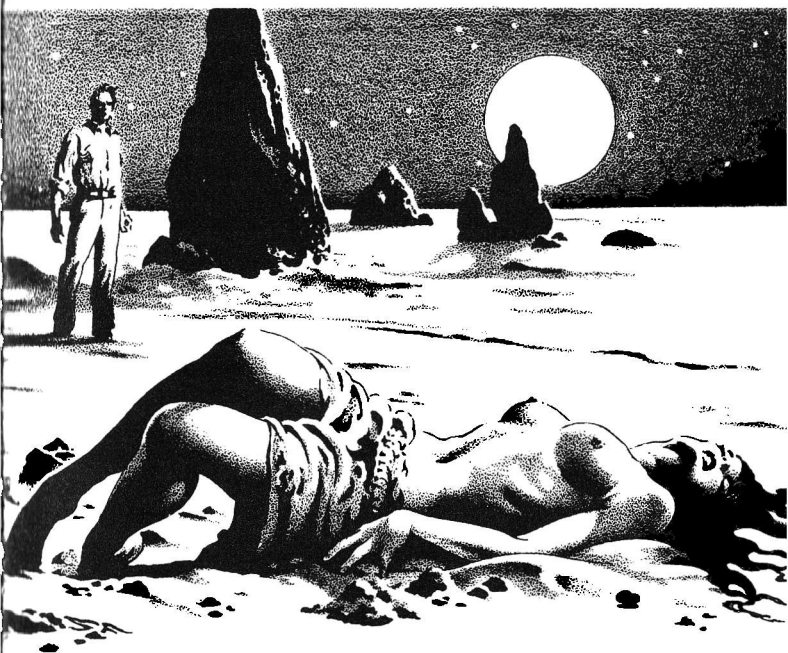
If you can't stand your own life, he had said to her, then I suggest you put an end to it. I have an interesting life of my own that's going to take all my time. The room

seemed still to echo with the words.

The waves were getting a little louder now, rolling invisibilities up the invisible beach.

He went into the house and turned up the volume of the television slightly; he could not really remember having turned it on. The voices from the talk show came with him as he went outside again, onto the seaward patio. The hyperfine and superhyperfine splittings could now be measured accurately, but that was only the start. Police forces all over the country were using the technique on unidentified bodies every day, with great success. Nobody worried anymore that the technique might offer any danger to the fabric of the world. The implications were really vast. The ligand fields expanded without limit. The voices continued to follow as he opened the gate in the low wall and walked down a slope of sand to meet the still invisible burden of the waves.

—Fred Saberhagen



(continued from page 1)

of organizationally; the various government "reforms" and cutbacks of the last decade have left NASA pretty constipated. Next, G. Harry Stine (see the cover of this issue) examines "Space War I." He concludes that if it comes to pass our survival as a sovereign nation will depend on good luck and perfect management, starting *now*. (For a diametrically opposed view see Fred Pohl's "The Wizard Wars." Not too little, but too much, claims Fred.)

On the other hand, once we get into Space in a big way, just maybe we can leave all our juvenile bloody mindedness behind, says Joe Haldeman in "Peace From On High." Well, Space may be expensive, but just this once *Destinies* will second the notion of "peace at any price."

But now that Secretary Brown has informed us that we have no land-based second strike capability, that we must strike first or not at all, perhaps there is no price so high, other than surrender, that it can buy us peace. Will the Soviets be tempted into a "surgical" strike against our ICBMs? At worst it would cost them twenty or thirty million Russians (about what they lost in World War II), and they might get off Scott-free. Stalin would not have hesitated. Read Dean Ing's "Living Under Pressure." Do precisely what he says and you just might survive from as close as four hours downwind from the plume.

Next issue? We feature a story by Gregory Benford about a hero who wasn't, and a non-fiction article by Charles Sheffield and Mark Wistar on the absolute limits of optical astronomy, and what we'll see on the way. Plus we got Dean Ing, Frederik Pohl, Jerry Pournelle, Norman Spinrad, and (as the saying goes), much, much more.

See you then.

NEW

**THE
INSURMOUNTABLE
OPPORTUNITY**

BEGINNINGS

by

JE. POURNELLE
PH.D.

**GIVEN ADVANCES IN
ARTIFICIAL INTELLIGENCE
AND TELEFACTOR CAPABILITIES,
WHAT BOLD NEW MISSIONS
CAN WE PERFORM IN
15, 50 AND 100 YEARS?
(HINT: WE CAN NO LONGER PUT
A MAN ON THE MOON IN TEN.)**

I've just had an astonishing experience: one of the highest officials of NASA solemnly informed me that the United States cannot put a man on the Moon within ten years.

"But," spluttered I, "we did it in eight, starting from a lot less, in 1961. Surely we can do better now?"
"No."

Now I know what you're thinking. I was asking about technical ability, and the NASA official must have folded in his opinions about national priorities and budgets and the like, and thus answered a question I hadn't asked. I wish that were true, but I fear it isn't so. Let me start from the beginning.

Last spring, Marvin Minsky, one of the really top experts in the field of Artificial Intelligence (AI), called to tell me of an upcoming NASA conference on

future missions. The participants would be a dozen or so of the brightest and most creative people in the space sciences. Would I be interested in attending?

At first I thought he meant that I should come as a journalist, but no, the steering committee had offered me a seat as a participant. I wasn't going to refuse that. Thus in due course I found myself working to a schedule for the first time in more than a dozen years. The conference was intense: up in the morning, breakfast with the other participants, conferences until lunch, conferences after lunch, dinner with the other participants, and then "informal meetings" until sack time.

The Chairman, Bob Cannon of Stanford (who incidentally looks startlingly like screen actor Arthur Hill), did quite a job, cajoling this gaggle of temperamental, opinionated characters into working together instead of cutting each other's throats. We were on a tight schedule because Robert Frosch, Administrator of NASA, was due to join us before the end of the week, and we wanted some results to discuss with him.

The meeting task was "Given advances in Artificial Intelligence and Telefactor capabilities, what bold new missions can we perform in the 15, 50, and 100 year time frame? And what technologies must we begin developing now in order to perform those missions?"

Aha, thought I, maybe a science fiction type belongs in this group after all.

About that word "telefactor": old time SF readers will be more familiar with the term "Waldo". A "teleoperated system" is one controlled by a remotely located human operator, with or without computer assistance. As an example: if we want to do lunar strip mining, we need not have the bulldozer operator on the Moon. He (or she) can just as easily be in Houston—or in Hollywood, or Dubuque, or Re-

sume Speed, Michigan for that matter.

We were also given a conceptual model: suppose we could put a large package into an environment rich in raw materials. Could that initial package make factories without human assistance? Ideally, could it make factories which would in turn make robots which could make more factories to make more robots, etc., thereby achieving something like exponential growth? Because if so, we're on the track of untold wealth.

Thus a lot of the conference was devoted to the problem of "self replicating systems": machines that make copies of themselves. Ideally they'd also make something useful as well but it's obvious that any machinery capable of duplicating itself without human assistance would also be capable of making all kinds of valuable stuff. In the worst case we could simply harvest factories and robots.

Well, it's a terrific idea. Moreover, people who ought to know see no reason why it can't be done. *When* is another matter. On the one hand, the Japanese certainly are trying to make completely automated automobile factories, and most experts expect them to succeed a lot quicker than the United Auto Workers would like. On the other, doing that with no humans at all, and using, say, lunar materials, will take a bit longer.

Since we don't need anything as complex as an automobile factory, perhaps we can design a simpler self replicating system (SRS)? After all, the Moon is rich in useful materials. Iron wire isn't as efficient as copper, but there's a lot of iron, and who cares about efficiency when intense sunlight is free and you're after exponential growth? So a lot of very bright people (from graduate students to Roy Smelt, retired Chief Scientist for Lockheed) worked on simplifications. Minsky thought hard about *very* simple technologies, such as Erector Sets (as a boy he'd built

a pretty good mechanical hand from a Meccano set, and with smart computers to drive it, might it not be able to assemble another?)

A lot of thought was given to how to eliminate bearings, and must you have hinges? and can you do without the wheel?

We looked at ways to use direct process heat instead of electricity. Danny Hillis, one of Minsky's graduate students, suggested a lunar "sunflower" which focusses solar heat on the lunar surface to fuse the regolith into a mirror, then, using bi-metallic flexure, walks off to do the same job over again. Controlling the mirror doesn't look impossible, but getting the neonate "flower" erect isn't easy. My own suggestion was that another "sex" of the machine comes up to process the "embryo."

There were a number of interesting ideas, but the bottom line was that while we surely would be able to build a lunar (or asteroidal) SRS some day, it won't be soon. We can design systems to minimize dependence on human beings; we might even get down to needing only one person; but eliminating that last man looks to be at least ten times as hard as eliminating the next-to-last, and it won't happen in the next twenty years.

So far, then, the study has negative results. It was not, I hasten to add, a useless exercise. One of our missions was to identify problems we ought to be working on: what aren't we doing that we ought to be? What does NASA's technology research office fund tomorrow morning? We identified several worthwhile projects, and that was worth more than the price of the conference, even if we can't put a self replicating factory on the Moon by 1995.

Or can't we?

Now for the minority report. I think we can.

* * *

Query: can humans be part of a "system"? Because if so, it's very clear we know how to build a technologically sophisticated SRS. It consists of people plus tools plus raw materials.

To be precise, a lunar settlement.

I don't mean a base. I mean a settlement, or, to use a word in bad repute just now, a colony. The difference should be clear: settlers don't expect to come home. They're going to live on a new frontier; to make a New Beginning. Plans for settlements need not include much payload for bringing people home. At most you need a lifeboat, an emergency means for rescuing survivors in case of disaster. Perhaps you don't need that. It depends on whom you ask. Those sending the colony might want to salve their consciences, but the settlers could well prefer that payload go to more equipment.

A lunar settlement would be quite valuable. It's an obvious springboard to really large space operations. For example, there's lots of oxygen on the Moon, and it's not so hard to extract from the rocks. A lunar establishment could fling that into Earth orbit for use by construction crews for space industrial satellites.

Lunar refineries could extract iron and aluminum for Earth orbit operations. For that matter, any mass, including random lunar rock, is valuable if you can put it in Earth orbit—and there are several ways to get material from the lunar surface into space. It can be flung up by "electric cannon" or even by a Kevlar slingshot; once in space you can use low-thrust ion engines fueled with lunar materials for maneuvering.

The lunar settlement would give Earth a new resource base. A whole planet of untapped wealth. And when people *live* on the Moon we will finally and forever have escaped the dangers of "Only One Earth."

There are some problems with a lunar settlement.

Finding settlers isn't one of them. A random example: a local commercial electronics firm was hired to video tape part of the conference final report. I asked the two camera technicians if they'd be willing to settle on the Moon, even though there'd be no way to come back. "Like a shot," said one. And he meant it.

The economic problems are more difficult. An early lunar settlement—say one put up in the next ten years using Shuttle as the primary launch vehicle—would be expensive, and thus must be kept to a minimum survival level. (My preliminary analysis—wild guess?—would be 12 to 20 people.) Most of their initial effort would go to survival effort and living space expansion. They wouldn't have much time for efforts primarily useful to Earth, such as manufacturing solar cells for the Solar Power Satellite, or just putting lunar material into Earth orbits. It would take a while to get any payoff from the kind of colony we could send right now.

Suppose, though, that we could *amplify* their efforts? That each settler could do the work of ten to fifteen skilled people? Then things would change dramatically.

And of course that's possible. Minsky has described the concept in previous publications. When you send up the colony, you send up a number of Waldoes. A lunar colonist doesn't drive the bulldozer; that's done from Earth. The colonists needn't even do most of the repairs; leave that for experts who've never left the ground and who're working in shirt sleeves. Oh, sure, sometimes things will go wrong in a way that requires human intervention; that's what the colonists are for, after all; but we can try to drive that number of jobs to a minimum as time goes on. We can redesign our Waldoes as we learn what unexpected jobs have to be performed.

At this point you're thinking "time delays." How

can you run a lunar bulldozer from Earth when it takes $1\frac{1}{2}$ seconds for your command to get up there, and that long again for you to see what's happening?

It's a special case of what's known in the trade as the "Rover Problem," namely, how can we keep a lunar (or Mars!) roving probe from running over a cliff.

Notice, though, that our problem is much simpler; we're running our Waldoes in an explored environment, and if we want to use the Waldo to look into strange terrain, then we'll control it from the Moon on the first pass. Thus my bulldozer won't run over a cliff because I'll keep it a long way away from cliffs.

Second, notice that many tasks (especially those in a thoroughly known environment) don't need constant attention. The bulldozer in a strip mine: assume we need to see what each shovel-full of stuff looks like before we dig it. This means that we pause a few seconds at the end of each dig and load cycle; not a very hefty burden, and in return we run it three shifts and from Earth.

Now we want to move it, at, say, 10 miles per hour, which is about 15 feet per second; then I need to see 45 feet plus the stopping distance. If we're taking the 'dozer through crowded areas, we don't drive it from Earth; but for across-country transport there's no real problem.

Now consider a more delicate operation such as machining small parts.

What you need is a computer on board the Waldo, and another at the operator's console. Each computer has in its memory a "model" of the task to be performed, and what it expects to happen at each stage. Now the operator gives a command. This goes simultaneously to the Waldo and to the operator's computer. The operator's computer automatically builds in the time delay, then acts as if it has executed the command. Using the model as its information source,

it tells the operator what it thinks the Waldo is doing. It is also comparing it's latest information on reality with what it *thought* the Waldo was doing 1.5 seconds ago.

Up on the Moon, the Waldo's computer *knows* what is happening; but since it also has a copy of the operator's computer model, it also knows what its boss *thinks* is happening. It continually compares truth with reality, and if the discrepancy goes beyond previously set limits, the Waldo executes a previously designated fail-safe sequence, and tells the operator, "Boss, I'm confused. Here's what things look like to me. What do I do next?"

In fact, by putting smart but ignorant computers on board the Waldos, we can teach them to become robots. Suppose an Earth operator has just taken a Waldo through a complex task. He then asks the computer, "Remember how you did that?"

"Yeah, boss."

"Put it in permanent memory."

It all looked good to me, and I proposed that we try to design the colony. Not in gory detail, because we weren't that kind of group and we didn't have that kind of mission; but we could, thought I, take a very hard look at just what we'd like the Waldos to do, and what we have to know in order to construct Waldos that can do it.

Which may or may not turn out to be a lot. AI and telefactor technology have progressed enormously in the past few years. I recall that about five years ago, John McCarthy of Stanford's Artificial Intelligence labs bought a Heathkit color television with the firm intention of having it constructed by a machine. Moreover, it wouldn't be a teleoperated machine, either, but one controlled by a computer; in other words, a true robot. And of course he didn't manage that, and indeed wasn't even able to get the box

opened.

Also, I recently talked to one of the people who operate the research sub *Alvin*, and discovered to my horror that Alvin's "hands" are two-fingered clumsy things actuated by toggle switches. Meanwhile, Vic Scheinman, one of McCarthy's graduate students, brought to the conference a small robot which can draw and write and do fairly amazing things under computer control, and is really only limited by its very clumsy mechanical two-fingered hand.

Vic has built a very sophisticated arm, and devised excellent computer programs to control it. Not only does the arm know where it is at all times, but it can shift from universal x,y,z coordinates to coordinates oriented about the hand/wrist. It can grab its specially modified (inserted in a block of wood to let the two-finger "hand" grasp it) ball point pen, and it can set objects down precisely where you want them—and, if they haven't moved or fallen over, get them again.

But it couldn't turn pages of a normal book, and it couldn't open a packing crate; not because Vic can't tell it how with the Heathkit H-89 that runs the system, but because the hand on the end just isn't good enough.

In other words, the brains are ahead of the hands, and there's got to be a lot more research on hand/actuator technology, with considerable cooperation between the AI computer types and trained mechanical engineers. At the moment, when AI people need something done, they're so underfunded that if they need a power supply they generally can't just go buy one for \$750; instead, a mathematician assembles a kit bought for \$300. It's a tragic waste of scarce brainpower, and not much of a way to save money; and we need the development too much to leave it to chance.

But isn't industry developing "hands"?

Yes and no. Yes, of course there's a lot of money going into automation technology; but most of it tends to be for special purpose systems. One of Marvin Minsky's favorite laments is that instead of designing general purpose hands for Waldos, industrial designers keep trying to "improve" things. If you need a screw turned, why not have an arm with screwdriver built in? Why have a hand, when the special purpose arm does so much better? And indeed it does much better—for the job it was designed to do. What it can't do is a job you didn't expect—such as opening a relief valve inside the reactor containment at, say, Three Mile Island . . .

The general purpose/special purpose fight won't end soon; indeed we had a replay of it every day. John R. Pierce of Cal Tech and JPL (you may know him better as the SF writer JJ Coupling) was another conference participant, and he is still convinced that the special-purpose route is best. His convictions are important; after all, Cal Tech and JPL design and build space probes. He may be right; but I know damned well that we can't build the Waldo-augmented lunar colony without at least *some* general-purpose actuators, and the five-fingered hand is still likely to be needed because most of the tools we'll send for use by the colonists require them—and after all, what we're looking for is ways to let Waldos do jobs that would otherwise use up the settlers' time (or be beyond their ability).

Until we try to build mechanical hands we won't know what we can do; and thus it seems worth considerably more effort than is going into it now.

We were supposed to look for "bold new missions," and also identify technology requirements. My thought was that the lunar colony concept was ideal for the purpose. First, it was universally agreed among the participants that the only self replicating

system we could build before the year 2000 would have humans in it. Secondly, having designed the colony, we could start work on minimizing the need for people, thus identifying tasks we want AI/Waldos to perform.

Thus I advocated that the study team do preliminary design work on the only extra-terrestrial self replicating system we can build before the year 2000. Doing that design would point up critical technology areas we ought to study; and my first cut at the problem doesn't identify any "show stoppers," i.e. capabilities we can't have before, say, 1990, meaning that we could, if we wanted to, actually put up a lunar colony by the year 1992; possibly earlier if we're willing to give the mission enough priority.

That's where it hit the fan.

By golly, you'd have thought I was advocating treason. Now, here I have to be careful. We were, after all, a study group with limited resources. This was one of the first intensive interactions between space science people and the Artificial Intelligence community, and we were, after all, supposed to look at what automation and AI could do for space. The conference was funded by NASA for a definite purpose, and manned space wasn't really the purpose.

So: many of my colleagues didn't want to devote a lot of time to lunar colonies.

The counter argument is this: if we wait a while, machines may be able to do all the lunar work, and, moreover, do it much more cheaply. Thus, isn't it really better to wait fifty years? Why take chances? Why send settlers to an untamed wilderness when we can, eventually, send up machines to prepare them a Hilton Hotel?

And that is no longer a technical discussion. That one involves philosophy, and national purpose, and economic priorities, including a very serious answer

to the question "Why waste all that money in space when there are so many things we need it for right here on Earth?" And yes, there are NASA engineers who ask that question.

Worse, there are NASA officials who say we simply can't do it. We cannot put up a lunar colony by 1992. We can't even put a man on the moon by then. Not that we won't, not that Congress won't pay for it, not that the people won't stand for the expense, but that we CANNOT do it no matter how hard we try.

"But," spluttered I, "but we *did* it—"

"Things are different now."

And if that isn't bad enough, try this one: when I proposed lunar colonies, one of the very highest NASA officials asked me, quite seriously, "Why would anyone want to live on the Moon?"

That floored me. It's as if a provincial bishop, after working all his life for the Church, went back to the Vatican and discovered that the Curia is filled with atheists.

"Heretics," I muttered to myself. "Invite 'em to be guests of honor at an auto-de-fe. Let 'em get jobs in broom factories."

Which is an understandable first reaction, but it's also wrong.

"I funded the Sagan Committee," one of the heretics told me. "And my office funded this study, and we invited you, so dammit, how can you say we don't believe in space?"

And that's all true. Me, I can afford to be a true believer. I know there's growing support for space and spectaculars and national achievements. I don't have to face a Congress that believes the public is bored by space. I spend most of my time among other True Believers, while these poor chaps in Washington end up thinking there's nobody but them to keep the dream alive.

And they have kept it alive. Whatever happens, they deserve well of us, and if I can persuade a few NASA officials to come to a World Con I expect my fans to cheer them wildly. They haven't had an at-taboy! in a long time, and they've got one coming; and when the True Believers do get some influence one day, it would ill suit us not to reward the faithful who've labored in Washington's barren vinyards.

But there do have to be some changes made. Let me tell you a true story.

Consider a scientific satellite. It's all self-contained, and only needs to be put into Earth orbit. It could be launched with Scout, but the Scout production lines are being closed to build missions for Shuttle. This, incidentally, is an administrative judgment call I'm not competent to second-guess. After all, Shuttle's the only big game we have, and if some things have to be done inefficiently to keep Shuttle going, then I suppose that's a price we just have to pay.

But putting our satellite on Shuttle has some penalties. For one thing, the Shuttle managers are scared stiff that someone will muck up the ship. To prevent that, users have to deliver their payload many days in advance of launch—and cannot have access to the payload after it has been handed over to the Shuttle people. Our satellite can't survive many days without power, so we'll need juice from Shuttle until just before launch.

Fine. We design the satellite to take standard ship's power, and now we're ready to interface with Shuttle. What we need is electricity, some means to disconnect the satellite once it's been delivered to orbital speed and altitude, and some way to get it out of the Shuttle bay. That latter doesn't seem much of a problem; a spring would do it, or a small soda-water cartridge, or indeed, a crewman could go back and shove the darned thing out.

It all seems simple. Of course things in space aren't always as simple as they look. We can accept that there are additional systems integration costs. Now. I invite you to take the wildest, most outlandishly extravagant guess you can make as to what those systems integration costs will be. Go on, think about it. Think big.

I've had estimates go from a couple of hundred thousand dollars to Larry Niven's guess of three million. No one has even come close to the true cost: forty million dollars. But what, on Earth or in the universe, can you possibly get for the forty million bucks? Who knows? That's the cost, which is why a number of users aren't exactly thrilled by Shuttle.

I think, I just suspect, that number could be trimmed a bit. I keep remembering the old days, when we didn't have a space budget, and we did our space research in off hours and spare time with surplussed equipment; and I recall how much we got for very little expenditure. Of course we were True Believers, and this wasn't just another job, this was Space; and perhaps that's my point. We've got to inject more believers into the system. We've got to recover the "can do" attitude that once dominated the space business; because if we don't we're out of business.

But—now you see why there's so much crepe hanging. If it costs forty million bucks just to push a dumb satellite out of Shuttle, how can we even consider something like a lunar colony? The costs would be quite literally astronomical.

It's also why there's so much scepticism about Solar Power Satellites.

Just now, SPS is our biggest potential quick payoff from space. A 5 gigaWatt solar power satellite replaces 210,000 barrels of oil per day, 76.7 million barrels a year; if oil costs \$40 a barrel, that's over 3 billion bucks a year we don't have to ship overseas. A

significant saving.

The SPS program has some of the most sophisticated cost models I've ever seen. Their estimate is about \$100 billion for the first SPS (this includes building a new fleet of launch vehicles). Thereafter, each 5 GW satellite costs about \$11 billion—and, like a dam, requires no fuel.

Unfortunately, the system costs are dominated by the cost of material delivered to orbit. Those are hard to project—and some people simply don't believe we can bring them down. If we can't, we're stopped. SPS simply cannot be built if we have to absorb present expense per kilogram launched.

Or can it? Comes now David Criswell, formerly the Director of the Lunar and Planetary Institute of Houston. He has studied the Apollo-returned Moon Rocks for years, and concludes, startlingly enough, that we can build SPS with Shuttle at today's prices—provided only that as part of the program we establish a moon base, and we make a lot of our power satellite from lunar materials.

Criswell has done some detailed investigation of industrial processes on the Moon. He's looked at melting tanks, and large plate vibrators for separating lunar ores (the best model of moon rock is talcum powder, not sand), and ballistic separators. He's examined some wonderful ways to use energy for building structures. Consider this trick: take a long metal spike, heat to above the melting point for glass, and insert into lunar soil. The lunar materials melt and fuse. When you withdraw the spike, you leave behind a ceramic pipe. Now imagine an arched comb of such spikes placed so that the glass fuses together all along the length of the comb. Insert, heat, withdraw—and you have an arched glass cave or tunnel, suitable for making airtight and using as living quarters.

Lunar processes can be very energy inefficient;

there's lots of energy up there. Perhaps you can make inefficient photo-voltaic cells by the square kilometer. They just lie there on the lunar surface, ready to deliver electric power as needed.

Then there's silane, SiH_4 , the silicon analog of methane. It burns in oxygen with a specific impulse of 350, plenty good enough for rocket fuel; and although there's precious little hydrogen on the Moon, there's billions of tons of silicon. Hydrogen-oxygen rockets are "better," but by using silane you get a "mass multiplier" effect.

And so forth. It isn't clearly demonstrable that we could build SPS cheaply from the Moon—but it does look possible. It's not wild dreaming.

And there we have the basic conflict.

Some people see opportunities. Others see only problems. Example: one NASA official told me of a recent conference at Woods Hole, where a number of biologists were entirely negative on the concept of extra-terrestrial colonies.

The smallest self-sufficient ecology we know of, say they, is the entire Earth. There's no proof that anything smaller can survive. We can solve the problems we can think of, but we won't think of all the problems, and a lunar colony is just taking too big a chance.

The counter argument is obvious. Ingenuity overcomes a lot of difficulties. Biological isolation has advantages as well as disadvantages—if you didn't take it along, it won't be on the Moon. I'd think isolation from the syphilis spirochete and the cold virus and the cholera germ would be a positive benefit. And we're not proposing to cut off the colonists entirely and forever. If they discover they need vitamin pills, or, God save us, the common cold, we can send the stuff up. Most of it can even be hard landed.

True, we need some studies to show just how many kilograms per colonist per day of biological interac-

tion is required. My guess is that after you establish lunar "farms" you'll find it's more likely to be milligrams than kilograms, but leave that; the colony I propose would assume about a kilo per person per day. Three years supply of expendables comes to only 22 metric tons for the whole colony.

I didn't dream up those numbers. SKYLAB, with essentially no recycling at all, operated on about 1.2 kilograms/day for each crewman. Given lunar conditions—plenty of free cold, free heat, and free vacuum—recycling of water and inert atmospheric gasses should be simple and very efficient; and presumably the colonists can grow *some* of their own food.

The doomsayers don't see it that way. "We've never done it, and thus we can't try it . . ."

So perhaps we need a demonstration; what engineers call "proof of principle." Take a box of rats, and biologically isolate them. Now see what interaction is required: how many grams per kg. of rat must be introduced into the system to keep them healthy. It would even make a good high school Science Talent Search project. It's unlikely that a high school lab would be able to recycle gasses (no cheap cryogenic source) but that could be simulated by using sterile aviator's oxygen, or even highly filtered air, since it's biological isolation we're interested in.

In fact, the lunar colony concept could generate a number of high school and undergraduate and graduate research projects, none of them very expensive, all aimed at proving the principle that extra-terrestrial colonization is possible.

Such demonstrations would be useful. For every problem I've heard of, there seem to be several solutions. As to problems you haven't thought of and didn't think of—why, there are also going to be advantages and opportunities you didn't foresee. You either trust human ingenuity or you don't.

I point out that frontier societies are usually far more vigorous than their parent civilizations. I even think I know why. It seems to me the characteristic excretion of Western Civilization is bureaucratic structure, and once in a while you have to move off the manure pile to get things growing again.

But for the moment, the higher echelons of NASA, and of the Congress, and all of Washington, are dominated by people who see the problems and discount the opportunities. This is more an attitude than a reasoned position; and of course I hold the other view, that we should look for the opportunities and have some confidence in human ability to solve problems.

When I said that in the conference, the chairman told the following story. If you ever knew General Curtis LeMay, former Commander in Chief of the Strategic Air Command, you'll know it could quite possibly have happened.

A colonel ran into LeMay's office. "General," he said, "we have an insurmountable problem."

LeMay hit his fist on the desk. "Colonel, in this Command we don't have problems. We have opportunities."

The colonel looked thoughtful. "Yes, sir. General, we have an insurmountable opportunity."

Now that's a funny story, and everyone in the conference laughed, and I had no answer to it at the time. I've been thinking about it ever since.

First, it seems clear that they didn't have an insurmountable problem. That is, SAC still exists, so they got around the problem somehow.

Second—who in history really did have an insurmountable opportunity? And the name drops out immediately. Christopher Columbus.

Friends, we have an insurmountable opportunity.

—Jerry Pournelle

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HIDDEN VARIABLE

by Charles Sheffield



Wensiger's very reality
was based on modern physics;
he would stake his
life on it.



The beginning of the Scorpio meteor shower was estimated for 19.00 hours. Already there had been a couple of bright flares far below in the Earth's atmosphere, as early members of the shower signalled their arrival.

Jose Perona had trained the big scope downwards, turning it from its usual work of planetary observation. From the synchronous station, twenty-two thousand miles above the equator, he could easily see the lights of Quito, geometrical patterns of white points beneath them. After a few minutes he grunted and turned to his companion.

"What do you think, Mackie? That's the fourth meteor I've seen burn up in two minutes down there."

Mack Johnson glanced over at the wall display. He frowned. "Still over an hour to go, if that 19.00 hours estimate is any good. Where did it come from?"

Jose had pushed himself lightly from his seat by the telescope and floated over to the computer console. He made a rapid data entry and looked at the display console before he replied.

"Pretty old data. The Scorpio's are a long-period group—ninety years since they were here. I bet we're seeing some spreading in elements, even though Outer Station has been tracking them for a month now. Let's assume we'll need the screens up early."

Mack Johnson sighed. "That's going to make us unpopular, I know for a fact that Lustig has an X-ray observation going that he'd like to hold for another two hours. All right, better safe than sorry."

He picked up the phone and accessed public address. "Attention, all personnel. The Scorpio shower seems to be here early. The Wenziger screens will be switched on five minutes from now. Repeat. The Wenziger screens will be switched on in five minutes. Secure all external materials and prepare for communication blackout."

He disconnected and grimaced. "I give us thirty

seconds, Jose, then listen to the complaints come in. I bet that interrupts a hundred experiments up here."

Even as he spoke, the phone had begun to buzz angrily. He ignored it and coded in on Earth-link circuit. The Quito station cut in at once. They could see the com technician turning back from the window to face their communicator screen.

"Been expecting you," he said. "I've been watching the shower start—it's early, right?"

"Looks like it." Mack nodded. "We'll be cutting in the Wenziger's in about four minutes. The shower is supposed to last about fourteen hours. We'll talk to you again when we're shielded by Earth—six and a half hours from now, maybe a little more. Anything need saying that can't wait?"

The technician shook his head. "I have a pile of messages, nothing urgent. Talk to you again when you switch off the Wenziger's."

They cut the connection and began the final count-down. Jose Perona watched the outside displays as Mack reached the end of the count-down and turned on the Wenziger screen. Everything went dead on the display, instantly. Mack leaned back in his seat and looked again at the phone. The complainers had all given up their efforts to reach him.

"Ever wonder what would happen if the Universe were to end while we've got the Wenziger's on?" he said. "Think we'd know about it?"

Jose shrugged. "Not until we came back out again. *Nothing* gets through, if the theory's right. Perlman tried a neutrino detection experiment a couple of years ago, and he thought a couple of those were penetrating the screen, but he couldn't get the same result when he tried it again." He switched off the dead displays. "Won't need these 'til we come out again. You know, there's a funny thing about these Wenziger screens."

Mack was running through all the input receiver

systems . There was nothing but thermal noise on any of them.

"Funny thing?" He turned back to face Perona. "The whole idea of the screen's funny to me. I had years of the theory in school, and I still don't understand any of it. Just be thankful we have 'em, that's all—we'd have fried in that last solar flare without 'em."

"Yeah. Sure. I don't know how they work, either. But there's still something funny about them," Jose persisted. "They have the wrong name."

"Wenziger? What's wrong with that?"

They had settled back in their seats, secure in the knowledge that there would be—could be—no incoming or outgoing signal until the screens were switched off.

"Back when we had the theory, back when I was in school, we had to do a paper on the screens." Jose shrugged. "I was keen in those days. I went back to the original reference papers. Couldn't understand them, but I'll tell you one thing. *None* of those original papers was by Wenziger. Not one."

Mack was frowning, running his fingers over the channel selectors. "That's dumb. You must have missed something. I think I even remember reading papers by Wenziger in my physics course—long time ago, now, but I remember the name."

"Yeah, Wenziger was a physicist. But all the papers with the theory in them were by Nissom."

"*Laurance* Nissom?"

"How many others do you know?"

"None. But if that's true, why are they always called the Wenziger screens?"

Jose Perona was smiling smugly. "My question, let me point out. I told you there was something funny about the Wenziger's. All right then, Mackie, stop fiddling with those keys and listen. I'll tell you how they got their name—even a lump like you ought to

know this one. *Nissom* named 'em that . . ."

It was dark when he reached the wall; pitch-dark, moonless, with stars hidden by a heavy overcast. He squatted down and felt carefully for his first marker, a sticky blob of resin dabbed on the smooth stone surface. He felt his way down from the resin patch to the groove at the base of the wall, then traced a line outward to the small pebble of his second marker.

The darkness was complete. Everything had to be done by touch, by carefully rehearsed and precise movement. Slowly, carefully, measuring a line down past his braced fingers, he pushed the length of sharpened piano wire into the soft soil beneath the pebble.

After five time-consuming failures, he on the sixth attempt felt a faint pulse returned along the stiff wire. He had struck the coaxial cable that took the signals from the eyes on the top of the wall back to the house.

He straightened up, breathed deeply, and carefully brushed the loose earth from the knees of his trousers. The high wall, invisible, loomed beside him. He knew its exact height and the shape of the concave overhang that led to its top. The surface, cold in the summer night, felt smooth and seamless to his outstretched hand.

He placed his back square to the wall to give him direction, then using the lights of the distant house as a second guide he walked ten measured paces away from the wall. He bent forward. Plunging his hands through the upper branches of an azalea bush, he felt his way down to the cache hidden at its base. One by one, he pulled objects out from it and carried them back to the base of the wall.

Ten trips, and he had the whole collection. He ran his hands over them slowly, noting their exact positions.

They made a strange assortment, a rusting and

jagged heap of junk on the dry earth. He picked up the heaviest one first, a four-foot length of thick iron pipe scavenged from the boiler room. The rope tied around its jointed end was old and frayed, a discarded clothesline from the garden shed, but he had tested it carefully and knew it would be strong enough. Placing his foot on the rope end, he swung the pipe around and with a grunt of effort hurled it upwards and over the wall. There was a heavy thud as it struck the earth on the other side.

He waited a full minute, looking back towards the big house for signs of extra activity there. All remained quiet, but that was little reassurance. If the eyes on top of the wall were also tuned to thermal wavelengths, a cold object would pass where a man could not.

He bent to pick up his second find, a massive iron wheel from a derelict washing machine. He secured the end of the rope tied to it, then it too went over the wall to join the iron pipe.

One by one, the roped objects were thrown up and over. He fingered the final one for a few seconds before he swung and heaved. It was a heavy bronze statue of Mars, God of War, clad in helmet, armor, and massive metal leggings. He had seen and hated it every day in the library. Removing it that afternoon had been a pleasure.

Ten lengths of rope trailed upwards from his feet into the darkness. He picked up the whole bunch and began to twist them together into a single braided cable, turning until each one merged with its companions. Then he began to climb, feet braced against the wall. When he reached the top he paused and looked back at the house. Still no sign of increased activity.

He peered down. This was the unpredictable part. He had not been able to determine what lay outside and now he would have to jump blind. A ten-foot drop

onto sharp fencing would end everything.

Bracing himself, he pushed off hard with his hands and dropped into the darkness.

"Come on in, Wenziger. I'll be through here in a minute."

The man behind the desk nodded his visitor to a chair and went on with telephone dictation. His jacket was off and his shirt sleeves rolled up, to reveal strong and tanned forearms. A cigarette, lit but unsmoked, smoldered in the gunmetal ashtray in the middle of the big desk. The man who had entered the room received no further attention from him until a full page of dictated memorandum had been completed.

"Right," he said at last, dropping the telephone back onto its stand. "That should hold them for a day or two. You heard, did you, that our bird has flown?"

The other man nodded. He had been patiently sitting, knees together and heavy briefcase resting on his thighs. In contrast to the relaxed and casual man behind the desk, the newcomer was stiff and formal. He looked pressed and polished, from the shining surface of his black shoes, past the charcoal-grey suit to the glistening top of his bald, domed head.

"I was told as I came to the outer office. In view of this, General, perhaps our meeting will not be necessary?"

His voice was soft and husky, with a faint trace of an accent. Not quite German, somewhere a bit farther east.

The man behind the desk picked up his neglected cigarette and inhaled a long drag.

"Like hell. We need to talk *more* now. They had Laurance Nissom in a maximum security hospital and he got out. Before this he could have been just a kook. Now I need to know all about him." He tapped the thick dossier on the desk in front of him. "Lots of

stuff in here, but nothing about this new work. Did you get through the stuff I sent to you?"

The bald head nodded again. Zdenek Wenziger opened his briefcase and took out a thick sheaf of xeroxed pages.

"I read it in some detail." He hesitated, biting at his thin upper lip. "General Greer, I really wonder if I can give you a useful evaluation."

He stopped as though there were more to say. The other man looked up quickly from the dossier. His eyes, bright and blue, seemed too young for the grey crew-cut hair and lined face.

"You need more time? Hell, this is supposed to be a top priority item. What have you been doing all week?"

Wenziger flushed at the tone of voice. "I have spent almost all my time on this since it came to me, General. Time is not the problem. The difficulty is one of full understanding."

"You telling me you don't understand what Nissom wrote?" Greer slapped the dossier onto the desk. "I can't buy that. You're our top physics consultant, aren't you? Whistler over at DARPA warned me that getting evaluations out of you was like pulling teeth. I *have* to have an answer. Is there a chance—any chance—that Nissom's work could produce the effects he claims?"

"If you put it that way, I will have to say no. Almost certainly, no."

"*Almost* certainly! What the hell use is that to me? What's the doubt, you're the one with all the fancy awards, not Nissom. You shouldn't have any trouble sorting out what he's saying."

Zdenek Wenziger had closed his briefcase and placed it on the floor beside his chair. He sighed. "General Greer, you insisted on a one-word answer to a complex question. I was foolish enough to try and provide one. Will you give me five minutes to try and

explain?"

Greer looked at his watch. "Take five, take ten—but give me an answer I can use. You know I've got forty men out there trying to trace Nissom?—and they're all coming up cold. There's a lot of classified stuff locked up inside his head."

"I believe you. There is also a lot of unclassified stuff." Wenziger took off his glasses and began to polish them with a spotless white handkerchief. His eyes were revealed as a mild and watery grey. "The content of the paper you sent was new to me, but not the style. I have been dealing with Laurance Nissom since he was a graduate student. If anyone can claim to have a fair understanding of how his mind works, I suppose that I am he. And I tell you that I have at best an imperfect understanding of that process."

"You mean he's smarter than you are?" The tone was sceptical. "You're the one with all the awards, not him."

Wenziger smiled faintly. "Yes, General. I have all the awards. I am also sixty-seven years old, and Laurance Nissom is thirty-one." He leaned forward. "Do you realize that Einstein himself did not win a Nobel Prize until he was well into his forties? And that when he did win it, it was not given for his most profound work? If Nissom were to be right—and I do not believe that he can be—it would be another five or ten years before the implications would be understood. I could draw you almost an inverse correlation. The more profoundly original the work, the longer it takes to reach a point where a Nobel Prize Committee is ready to accept and recognize it."

"I hear you." The cigarette had been stubbed out to join the ashtray litter of stubs, and Zdenek Wenziger had the full attention of those bright eyes. "You're telling me that Nissom is smart. I know that. I want to know, *how* smart. I mean, the way you're talking, is he likely to win a Nobel Prize some day?"

"I think so. But you are still asking the wrong question." The careful polishing of the eye-glasses had continued, though any speck of dust had long since disappeared from them. "This may sound ridiculous to you, General, but at the highest level of creativity the award of a Nobel is not an adequate measure. There is as much spread among Nobel Laureates as there is among—how shall I put it?—professional quarterbacks. All are good, but some are pre-eminent. Do you by any chance speak German?"

"A few odd words. I was stationed in Frankfurt for three years, but that was ages ago."

"Three years?" Wenziger registered surprise for the first time. "Didn't you find it most inconvenient to be unable to speak the language?"

"Hell, no." Greer laughed. "Anything I needed, I just waved a mark at 'em. That always worked." He leaned forward. "I'll let you in on a little military secret. You don't get two stars in the Air Force for learning foreign languages. They're about equal to a big fat zero on your promotion rating. Any spare time I had on watch over in Europe, I used it reading Clausewitz on war, or Machiavelli on using a power structure. If I want a Ph.D. in languages, I just call in some over-educated major. Whatever it is, say it to me in English."

"Very well, General, we will do it in English." The old man looked resigned, shaking his massive head slightly. "Bear with my translation. For almost forty years, Albert Einstein and Max Born—both Nobel Laureates in physics—kept up a friendly correspondence in German about work and other things. In describing their correspondence, many years later, Born talked about his first exposure to Einstein's work. Remember now, this was many years before Einstein was famous, many years before he won a Nobel Prize. He did not even hold a university appointment. But Born, recalling the first time that he

saw Einstein's work, says: 'We all knew at once that a genius of the first order had arisen.' I'm translating his words, but do you see my point?"

"I think so." Greer's head was cocked to one side, his manner sober and thoughtful. "If I can see past your funny way of putting it, you're telling me that it takes one to know one. Great physicists can recognize super-great ones before anyone else can—including the fellows who award the Nobel Prizes. Right?"

"You have it exactly. In my opinion Laurance Nissom is one of those rarities, even among Nobel Laureates, the 'genius of the first order' that Born recognized in Einstein."

"So dammit, you're telling me that he's *right* in this cockeyed theory!" Greer sat up straighter in his chair. "We've got to get our hands on him. Do you know what this could mean to the defense of the country?"

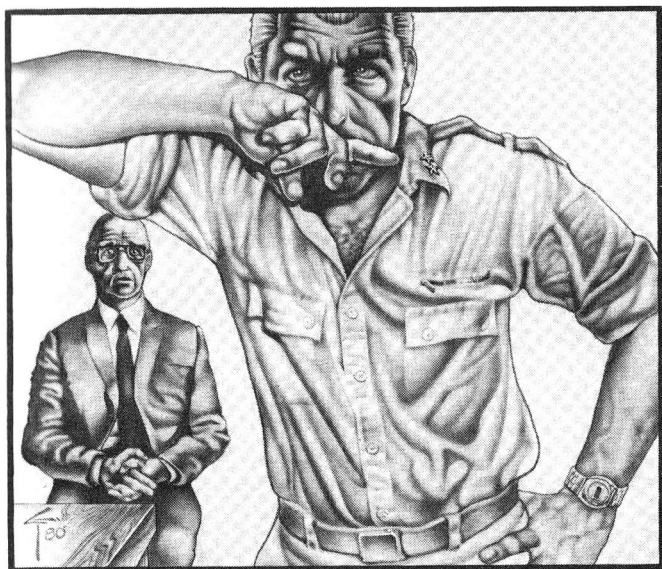
Wenziger replaced his glasses. He held up a carefully manicured hand to the other man. "Gently, General. Let me finish. I had to tell you all that, to explain why I would be forced to view *any* of Nissom's work with great respect. Having said that let me now say something else. I am almost certain, as certain as I can be about any theory, that Laurance Nissom's latest work is not correct."

"My God, you're choosing a funny way of telling me it." Greer leaned to the side of the desk and pressed the Intercom buzzer.

"Yes, General?"

"Get Major Merritt over here with the Nissom progress report." He turned back to Wenziger. "You'd better be right. If you mess this up and give us the wrong evaluation, you can forget your clearances and my career. You'll lose your industry consulting too. I tell you, we're playing hard ball on this thing."

He walked over to the window and looked east towards the Potomac. Behind him, Wenziger had gone rigid in his chair.



"All right," said Greer at last in a quieter tone. He did not look round. "So why is Nissom wrong? I couldn't read that paper, it'd all be Greek to me. But I've seen the memo that he sent to Colonel Perling saying that he was onto a development that would make all our defense systems obsolete as chain mail. You don't agree with that?"

There was no answer. He turned from the window to the older man.

"What's up? Lost your tongue?"

Wenziger shook his head slowly. "I'm sure that you have your dossier on me, too, General. There must be information in there on my financial position." His accent had thickened. "I am not fortunate enough to share in your generous pension systems. Even with the government's assistance medical expenses are heavy. I will do my best for you on this matter—as always—and in exchange I hope that you will not seek to deprive me of my livelihood."

Greer walked back to the desk and sat down behind it. He leaned back in his chair. "We'll see. I'm not making promises until I see how this works out. Now tell me about Nissom's paper."

"I will do my best." Wenziger reached again for his briefcase, a slight tremble in his thin hands. "But again I must have time to explain. We are dealing with complex ideas, and even with my best analysis Laurance Nissom's paper seems incomplete. I would have expected more on tests, more on applications. That is his style, the style I know . . ."

He looked across the desk, waiting for some word from Greer. The other man looked back at him impassively.

"The basic idea is not new," went on Wenziger at last. "It is a variation on the old 'hidden variable' theories of quantum mechanics. In that field, there are certain combinations of quantities, conjugate quantities, that cannot be known simultaneously beyond a certain precision."

Greer nodded. "Heisenberg's uncertainty principle." He grinned at Wenziger's poorly disguised look of surprise. "Don't assume too much. Science background is one of the things that count on our evaluations. I've had physics courses, more than you'd think."

"That will help this a lot." Wenziger looked around him as though vaguely seeking the familiar blackboard.

"The Heisenberg principle," he went on. "That is Nissom's starting point. It reflects the fact that the fundamental processes of quantum phenomena must be interpreted using *probabilities*. We cannot predict how certain events will turn out, only the *chance* that they will result in one of several outcomes. That idea was developed sixty years ago, back in the twenties—mainly by Born. But many people found it hard to accept. Einstein himself was one of those.

From him, and others who felt the same, came another idea: that we have not been observing 'reality' at the most fundamental level in quantum experiments."

"You've lost me." Greer's face was intent, and another lit cigarette was smoldering unattended in the ashtray. "What do you mean by 'observing reality'?"

"The easiest analogy for you might be with the behavior of an ordinary gas. We seem to have well-defined quantities like temperature and pressure for a gas, right? We can measure them, they are smoothly varying functions. Now look at a very small quantity of gas, and you start to see the effects of individual molecules. The idea of a single pressure, or a single well-defined temperature, disappears. In its place we have to think of the separate gas molecules, and their motion. They are the hidden variables of the system, the ones that control its basic behavior. Pressure, temperature—they have become *statistical* ideas."

Wenziger was surprised at the intelligence in the other's tanned face. Greer was nodding slowly, concentrating on every word.

"I'm with you again. You're suggesting that the probabilities you find in quantum theory are like fluctuations in gas pressure. They only seem like chance because we can't observe the smaller things that decide them—the 'hidden variables'. Couldn't you look more closely and see what's missing from the picture?"

"It's not that simple. I'm making it too easy, to get the point across. Nissom starts from a subtle problem in quantum mechanics, what's usually called the paradox of Einstein, Rosen and Podolsky. Most people dismiss that. He accepts it and uses it to introduce new basic variables."

"You mean smaller particles, things that are too small to observe?"

"Not that." Wenziger seemed easier, back in the familiar role of teacher. "Not particles. Nissom introduces a new set of field equations. Those are his variables. The four conventional fields—strong, weak, gravitational and electromagnetic—and the elementary particles, they arise as interference effects from the new fields. It is very elegant, and beautifully developed."

"So why don't you believe it? I don't track you fully, but it all sounds pretty plausible to me." Greer picked up his neglected cigarette, took one long puff, and ground it out.

"If Nissom's as smart as you say," he went on. "Isn't he sure to be right? Would he take a thing that far and still be wrong? I still don't see how you get from where you are to particle and field *deflectors*. That's what Nissom was talking about to Perling, practical defense against anything you can think of—for an individual. That's what got me excited."

"With a radical new theory you can expect a lot of new physical results—if it is correct." Wenziger's glasses had come off again and his eyes seemed to be focused on infinity. "But only if it is correct. I'm not objecting to Laurance Nissom's ideas because of the theory, you know."

"Then why do you think he's wrong?"

"The experiments. It's the experiments that he wants to do that let him down."

"He hesitated, then replaced his glasses and looked at Greer. "Did any of your physics courses ever mention Eddington, Arthur Stanley Eddington?"

"No. Physicist?"

"Yes, but astronomer and mathematician might be a better description. He was a leading relativist, and also the key figure in the development of modern astrophysics."

Greer shook his head. "Don't know him. Was he another 'hidden variable' man?"

Zdenek Wenziger frowned and thought for a moment. "Not to my knowledge, but he might have been. That's not why I mention him. Eddington had a brilliant career in England from about 1910 onwards up through the thirties. Then about 1940 he came up with a whole new theory—one that was supposed to explain all the main physical constants of nature with purely *mathematical* arguments."

Greer sniffed. "He's one up on me. I never managed to explain *anything* using math."

"It was impressive. Eddington had great mathematical ability and superb physical intuition. Physicists and astronomers all over the world took his 'fundamental theory' very seriously. It was profound, and it was very difficult to understand. Unfortunately, it had one deadly flaw."

"It wasn't right?"

"In one crucial respect. It did not describe the physical world that we live in."

Greer swung his chair forward. "Damn you, Wenziger, you have the most back-assed way of getting to the point. Are you trying to tell me Nissom is doing an Eddington? That he's got his head up his ass with this new theory? I thought you said it makes sense to you. Why are you saying now that it's wrong?"

"I told you." Wenziger's beaten expression was back. "I thought I was being very clear. It's the experiments. He's proposing a whole set of them—nothing wrong with that, but he's suggesting that they will give results that are inconsistent with the best-established ideas of twentieth century physics. If you need examples I can give you plenty. The Uhlenbeck and Goudsmit experiment on electron spin. His experiment would give a slightly different result. The measurement of the Lamb shift. Conserved vector current measurements. Non-conservation of parity. How many do you want? We'd have to turn QED upside down." He caught Greer's puzzled look.

"Quantum Electrodynamics—I'm not quoting Euclid at you."

"But why couldn't those experiments be wrong?"

"If just *one* of them were, it would shake modern physics to the bottom. All of them wrong? Unthinkable." Wenziger shook his head firmly. "You see, General, we theoretical physicists are free to argue with everything in the world—except experimental measurement. In my opinion Laurance Nissom has gone a little unstable. He is beginning to fantasize—which means that I must commend the astuteness of the man, whoever it was, that realized his behavior was peculiar and confined him to the hospital."

Greer looked at him. "Don't step outside your area of competence, Doctor." He leaned over to the intercom again. "Major Merritt here yet? Send him on in."

He leaned back in his chair. "I'm the one who put Nissom in the hospital, up in Gaithersburg. He's unstable, but I wasn't worrying about his mental health. I wanted him locked up safe while we checked out those theories." He laughed. "Don't look shocked, Wenziger. That third star is hard to get. You can't afford to sit back and wait for it, you have to take the initiative. I'm kind of glad to hear that Nissom's wrong, though. If he'd been right I'd have done my best to keep him in that hospital for the rest of his life. Did you know that he talked in one memo about *personalized* defense fields against anything? He even had the scheme in there that would make the whole of DOD irrelevant. I don't much care for the offices here in the Pentagon, but I'd sure be sorry to see us put out of business."

He turned to the young major who had appeared in the doorway and exchanged a brief salute. "At ease, Major. Dr. Wenziger, I would like to introduce Major Merritt of OSMS. He was up there in Gaithersburg yesterday."

The pink-cheeked major was looking uncertainly at

the elderly figure in the chair. Although the visitor had the appearance of a possible VIP, with no rank as a guide it was hard to know what relationship to assume. He nodded at Wenziger, but did not offer his hand.

"We have been discussing Laurance Nissom, Major," went on Greer. There was an edge in his voice. "Dr. Wenziger was asking me about the events in Gaithersburg—how it was that an unarmed civilian could escape unassisted from a maximum security military hospital. I thought you might be good enough to provide him with some of the details."

Wenziger had started up briefly at Greer's statement, then subsided wearily in his chair. Merritt would have to fight his own battles with Greer.

"Yes, sir." Despite the 'At Ease' command, the Major remained at attention. "I have discussed the matter in detail with the staff at the Gaithersburg facility. So far as we have been able to ascertain, the prisoner Nissom incapacitated his personal guard just after midnight by means of a blow on the head with a metal bed brace." He swallowed. "There had been no prior suggestion of violence. Dr. Rosenbloom was inclined to regard Nissom as a model patient."

"Then he's an absolute damned fool." Greer's tone was acid. "If Rosenbloom weren't a civilian employee I'd be looking for a court-martial. Didn't he have the sense to realize that a patient who cooperates when he has no reason to shouldn't be trusted one inch? Get on with it, Major, tell us their next failure."

"Yessir. Nissom had been allowed to move freely inside the house, as long as he had a guard with him. He walked in the grounds every day. They believed that would be safe enough, because of the high wall and the electronic sensors along the top of it. It was too high for him to reach the top and too smooth for him to climb."

"So how did he get out?"

The young major hesitated and looked at Greer in perplexity. "I thought you had already been briefed on that, Sir."

"Of course I have. Don't be an ass. I want you to tell Dr. Wenziger."

"Yessir." Major Merritt flushed and gazed straight in front of him. "Nissom had collected a group of heavy objects. They were old bits and pieces of metal, left over from the time before the building became a sanitarium. The night before last he penetrated the underground cable and inhibited the electronic eyes along a section of the wall. Then he threw the roped objects over. He used them as a counterweight so that he could scale the wall and climb out."

Greer looked at Wenziger. "Sound like Nissom?"

The older man shrugged. "I don't know the intelligence of your usual prisoner, General, but to Laurance Nissom such an operation would be a trivial exercise in planning and scheduling." He turned to Major Merritt. "The night before last was moonless. I'm sure that he planned on it. What was he wearing when he escaped?"

"Hospital pajamas. We think he may have dyed them black in the hospital studio, so they would be hard to see at night."

"And they'd pass as work clothes if he were seen the next morning," added Greer. "He didn't want people to notice him and give us any idea where he was headed."

"Yessir. He had no shoes, just hospital slippers, but we think he found a pair of old rubber overshoes in one of the gardening sheds, and put them on."

"What have you been able to find out today?" asked Greer. "He had no money, no credit cards. He must have found himself miles from anywhere, in the middle of the night."

"Yessir." There was a long pause, while Merritt

cleared his throat several times.

"We have been unable to ascertain any reliable information on that subject," he said at last in a wooden voice. "We have therefore been obliged to conclude that he must by now have managed to obtain assistance from some acquaintance of his in the Washington area. At this point in time, we have no information that might lead us to his whereabouts."

"In other words, Wenziger, we don't know a damned thing." Greer swung back to Merritt. "That right, Major?"

"That would appear to be the case, Sir."

"All right. Dismissed."

"Yessir."

Greer waited until the Major had left the room. He nodded his head after him. "I don't know how well up you are on Air Force types, but there goes a terminal Major."

"Was any of it his fault?"

"Not directly. His career's ruined, though. The system will squeeze him flat." Greer picked up the empty cigarette pack and crumpled it in his fist. "You don't make it far in the Air Force with anything but a perfect record."

Wenziger gave a thin smile. "I don't need your symbolism to get the point. You may find it hard to believe, General, but the same is becoming true in modern academia."

Greer gave a barking laugh of surprise. "That right? You know, I'll go for that. Dog eat dog everywhere, eh?" He opened a drawer of his desk and pulled out another pack of cigarettes. "I wasn't just thinking of Merritt. It's even more true for me. I have to turn this crap with Nissom into a personal success, or I'm screwed just as much as our friend the major." He cracked the pack open with a blunt thumbnail and offered it across the desk. "You've known Nissom for a long time, right?"

Zdenek Wenziger looked warily at the outstretched cigarettes. He nodded. "I was on his dissertation committee—as I am sure your dossier reveals. You now have my evaluation of his recent work, which I will amplify in writing. I do not smoke. If we have finished our business here, I would like to leave."

"We're not through." Greer took out a cigarette and balanced it, filter end up, on the desk in front of him. "Not quite. It's obvious that Major Merritt is right, Nissom had help from a friend in this area." He looked up suddenly into Wenziger's troubled eyes. "By now he could be anywhere in the country. Agreed?"

"I see no reason to doubt it."

"And he'll be staying with a friend? Or do you think that Nissom is the type to hole up in a motel?"

"I take your point, General." Wenziger sighed. "In my opinion Laurance Nissom is certainly staying with one of his friends. I agree with you. When can I go?"

Greer was nodding silently, staring at the balanced cigarette as though Wenziger had suddenly proposed a difficult and abstract problem. He opened the folder in front of him. "So, Nissom will be staying somewhere with a friend. We agree on that, don't we? But who are his friends? That's a question I can't answer. Not alone. Let me read you this, from one of Nissom's letters to a friend in Europe—you knew, of course, that we monitored his correspondence?"

"I could have guessed it." Wenziger's voice was weary.

Greer looked up briefly. "And you never read Machiavelli? Listen to what Nissom wrote. 'In my opinion, Wenziger's work on the use of resonance concepts to study modes of vacuum polarization is the prettiest piece of analysis in the past decade.' An odd choice of word, wouldn't you say? 'Prettiest'."

A touch of color flushed Wenziger's grey counte-

nance. "Nissom wrote that? I am surprised and gratified. He has read out my own secret thoughts. 'Prettiest' is not at all an odd choice. To a theoretical physicist, it is an *exact* choice."

Greer closed the folder. "You are adding weight to my idea. You speak the same language. I do not. Let me ask you another question. When I travel around the world, where do I stay?" He waved his hand. "Don't bother to try and answer that, I'll tell you. I stay with my old comrades. Naturally. After all, we share the same values and the same past experiences. Pick any country you like, and I'll have an old friend or an old enemy there."

He had lit the cigarette in front of him and now seemed to be concentrating his attention on the thin column of blue-grey smoke as it spiralled towards the ceiling. Wenziger did not speak, but sat, eyes down and head forward.

"So I have to ask myself," went on Greer at last. "Are scientists any different? Don't they have their old campaigns, their old comrades-in-arms? Isn't there an 'old comrades' network of scientists, in any city and any country? Don't they prefer to stay with their own kind?"

"You know the answer. Of course we do."

"Of course you do." Greer's intense blue eyes came back to Wenziger, lifting the other's gaze by some unseen force between them. "Of course. And of course, Laurance Nissom would be helped by the people in your network. We all look after our own kind if we can. It's dog eat dog if we have to, but it's dog eat cat first."

He drew thoughtfully on his cigarette, deliberately extending the moment. "So we have only one problem, don't we? Your network is like mine—it's for insiders only. I couldn't crack your circle, any more than you would be at home in the Army-Navy Club. But if there were someone—"

"No." Wenziger sat up straighter, his lips trembling. "I am not a fool, and I say no. It is clear where you are heading. I am not a fool and I am not a . . . a *Judas*."

"Easy now." Greer held up his hand. "Keep cool. I haven't asked you to do anything at all. What I'd like you to do is to go away and think about this whole thing. Look at it this way. If you wanted to, you could probably find out where Nissom is staying. We both agree that he needs help. He *has* been behaving oddly, more than the things you know about. If you doubt me, you can read the whole file on him. He's sick, and he needs help—he won't get that in hiding. You could reach him, persuade him to come back here—for his own good."

"To be incarcerated as a common madman?"

"Not at all. I've got clout, you've seen that already. I'd make sure that he got the best of treatment while we checked out his condition and all those wild theories he's been having. You've already assured me that they're wrong, so what's the loss? Anyway, think about it, that's all."

Greer's voice dropped suddenly in pitch and volume. "And while you're thinking about Laurance Nissom," he said softly. "Think about Zdenek Wenziger. Think about medical bills, and clearances, and finances, and the trouble there would be if you were blacklisted. I know you could get a position abroad—but could you get the medical treatments?"

"You would try this? It is blackmail, worse than blackmail."

Greer smiled pleasantly and stubbed out the cigarette in the full ashtray. "Now you're over-reacting, Professor. Since when was patriotism called blackmail? Nissom is dangerous to the country, and to himself. He should be in safe hands. Check me out. You'll find that I'm known as a good friend to people who help me, and a bad enemy to ones who go

against me." He stood up and walked around the big desk. "Why don't you call me this week-end? I'll be off at my farm, up in Thurmont, and we can talk better there than here—more informal."

As Zdenek Wenziger rose from the chair, Greer placed a muscular hand on the old man's stooped shoulder. "One other thing. This is just between us, right? Help me, and I swear that your friends—and the people here—will never get to hear about it. It will be our secret, no paperwork, no records of how you were involved."

He led the older man to the door. "I know how you feel now, but who knows? Something may happen in the next few days to make you think differently."

July 28th, 1980. POST WITH MAIN GATE
PERSONNEL.

Attention: ODR Security.

Subject: D. Z. Wenziger.

Please be advised of a delay in renewing OSU Clearance for the above. Pending resolution of situation, access to base cannot be granted.

July 28th 1980.

Dear Dr. Wenziger,

We have been advised of a delay in procurement. Since your consulting contract with us is contingent upon contract award, no charges should be incurred and no work should begin until you receive written notification from us.

Yours sincerely, G. Bayes, Contracts Officer.

Memo to: Dr. Z. Wenziger From: Travel Department
Subject: IAF Congress Date: July 29th, 1980

Previously approved authorization to attend this conference is withdrawn because of new budget limitations. You will be informed promptly should this situation change,

July 30th 1980.

Walter Reed Army Hospital,
Outpatient Department

From: ODR Records

Reference: AST-422
Wenziger, Z.

From: ODR RecordsReference: AST-422 Wenziger, Z.
Please note that Andemil is an experimental drug and its use is currently restricted to volunteer military personnel. Continued participation by the above subject in this program is prohibited pending renewed Special Exemption from ODR Central Office.

"General Greer?"

"Speaking."

"Wenziger here." The voice over the line was hoarse and muffled. "I have located Laurance Nissom. I have also met with him. What should I do next?"

"Well, Hallelujah. It sure took long enough. Where is he?"

"He would prefer that I not divulge that to you yet."

"Don't worry, I'll hold up my end of the deal. Could you bring him out to the farm?"

"I'm not sure." The voice was diffident. "I would need travel funds."

"You'll have them. When can I see him."

"Saturday? And a promise that you will be alone?"

"Just the three of us. I'll expect you about fourteen hundred hours. Pick up a road map from my secretary."

"And the injections?"

"Go on over to Walter Reed right now. I'll clear it while you're on your way there."

The old farmhouse had been set well up on the hillside, out of reach of floodwaters. With the aid of a pair of binoculars it was possible from the upper

windows to see cars as soon as they came over the southern rise, two and a half miles away. The heat shimmer on the road made it hard to be sure, but there seemed to be only one person in the blue VW with the Maryland license plates. Greer frowned. He walked down the stairs into the dirt yard and was waiting when Wenziger stepped from the car.

"What gives?"

"We came separately. He had to pick up a book. I expect him in about twenty minutes." Despite the heat, Zdenek Wenziger was dressed in a dark suit, tie and tight collar. His high, bald head was covered with a film of perspiration. Greer peered at him closely before he finally nodded, turned around and led the way into the thick-walled building. Wenziger followed him slowly, still lugging his heavy briefcase as they climbed the narrow stairs.

"Beer? It's home-brewed." Greer held up two bottles. He was shirt-sleeved, in denim patch-pockets and loafers.

"No. Thank you, no."

"Well, here's to Laurance Nissom anyway, the Invisible Man." Greer drank straight from the bottle. He seemed to be in high spirits. "How did he seem when you left him?"

"Under great stress, as you might expect. But sane. I think sane."

"But you didn't manage to talk him out of his pet theory?"

"I think not." Wenziger's manner was restless. He had placed his briefcase by the side of his chair and was staring out of the high window at the valley beyond with a strange intensity.

"And he couldn't talk you into it, either?" Greer watched Wenziger's fidgeting with a cool amusement. "Look, you can't be comfortable like that. Why not take your jacket off?"

"Thank you, but no. You are right, he could not

persuade me. I still believe that he is wrong." He turned from the window. "You were not completely honest with me when we met in your office. You did not show me Laurance Nissom's *second* paper."

"No, I didn't." Greer was unabashed. "I knew that if I you ever got to Nissom you'd hear about it first-hand. It didn't change his theory any. He showed it to you?"

"Of course. You are right, it makes no difference to the actual theory." Wenziger was still looking urgently out at the road winding away from the farm. "But it took us down to the nuts and bolts—the applications that I had looked for in the first paper and couldn't find."

A nod. "Right. The personalized defense field against all forms of attack? See what turned me on to it?"

"Defense against everything. You do not realize it, but that idea has a special meaning to me."

"I realize it. I told you, I know you." Greer was looking out of the window also, searching the road for a second car. "I know you a lot better than you'd ever believe. I've looked at your background, all the way from Czechoslovakia in the 1920's." He flashed a quick sideways look at Wenziger. "What's keeping him? Damn it, man, take that coat off before you boil."

"He will be here. I had a twenty minute start on him. He may have met more traffic than I did. Be patient." Wenziger's own manner showed no patience. A nervous tic moved under his left eye.

"You know," he said at last. "I didn't need the help of the 'network' to find Laurance Nissom. Not really. He was running. I have been running all my life—from Germans, from Russians, then from Nixon and McCarthy. I know just where people run to, where they hide." He looked across at Greer. "I wonder if I might change my mind. I would like a beer."

The other man uncapped a bottle and handed it across without speaking. Their eyes turned again to the quiet road.

"That's one thing they drill into us early." Greer's tone was reflective, abstracted. "Don't run. An army gets cut up worse running than standing firm. Face the enemy and hold your front." There was a curious smile on his tanned face. "So. This week you decided you'd had enough running. Too old to run any more. Right?"

Wenziger swung around. Beer splashed from the bottle onto the thick rug. "Why do you say that?"

Greer's gaze was still on the world outside the window. "I told you. I know you. I've seen men like you and watched your ways for forty years. Sometime last week you decided you'd had it, you couldn't take this thing any longer. You made up your mind that the only answer was to come here and kill me. Nissom didn't have to be right, it was the principle of the thing." He laughed. "Like to see the sales slip for the gun you bought down on Fourteenth Street? It's in my desk over there."

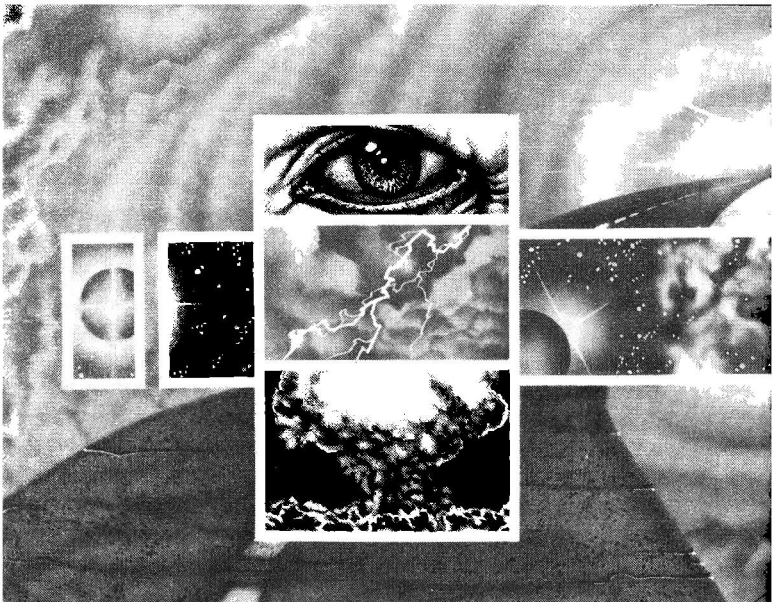
"You know about that? Why didn't you have me arrested then, instead of getting me here to taunt me with it?"

"No law againt buying a gun." Greer shrugged. "I own five or six of them. And I have to have Nissom. You're my key to him. But you've changed, haven't you? A couple of weeks ago you were convinced that his ideas were wrong—even *one* week ago you thought that."

"I think it still."

"You don't convince me. You changed your mind, a few days ago, and decided that Nissom had to go free. I want to know what changed you."

He leaned over and picked up Wenziger's briefcase. "I'll lay you any odds you like that you don't have the gun in here. See, I know you too well. No matter what



you think of Nissom—or of me—there's no way you could pull out a gun and shoot me cold. 'Ambition should be made of sterner stuff', don't you think?"

He opened the case and looked casually at the jumble of papers and books inside. "Did you ever fire a thirty-eight in your whole life? Any handgun at all?"

Wenziger had settled back on his seat. After an instinctive gesture when Greer picked up his case, he had relaxed. "Never in anger. At fairground shows a few times."

"So I'm still looking for an answer. What made you change your mind, even if you don't have the guts to follow through with it? Something that Nissom told you?"

"Nothing from my meeting with Nissom. I learned from a dead man." Wenziger flicked a glance at his watch, then back to the road. "Do you remember that I quoted Eddington to you, as evidence that genius is no protection against a wrong theory? I ought to have

quoted something else that he wrote, but it only came back to me a few days ago—just before I bought a gun. Eddington said, 'The world that we observe is the world of our theories'. *That* changed my mind about Nissom. You understand the significance of what he was saying?"

"No." Greer put down the briefcase without looking into it further. Like Wenziger, he had become obsessed with the thin ribbon of the road leading to the farm. "What does Eddington have to do with Nissom?"

"He meant that scientists become married to their theories. We look only for the things that our theories lead us to expect. Unless we think we'll find a result, why perform the experiment? Especially today, when experiments are very expensive. Let me ask you something, General. Did you ever look into Laurance Nissom's personal finances?"

"Sure I did, early on. I wanted to see if somebody could buy him."

"They could not. He is a rich man, right?"

"He's loaded. He inherited millions from his father."

"So why did he work for the government at all? Especially when he had his own theory to develop."

Greer lowered the bottle from his lips without drinking. He looked puzzled. "You've got me. Strange, I've asked every question about him except that one. He didn't need money, not the way that you do. Do you have an answer?"

"Equipment. He needed access to equipment that millions of dollars can't buy, but billions can. You see, he wanted to test his theory fully, in every branch. That would be hugely expensive—take huge resources. The world that his ideas describe is so different from the one we see that he had to build a whole new structure."

"But he's wrong." Greer moved uneasily in his

chair, sensing that somehow the control was moving to the other man. "You said he's wrong, and you still think so."

"I do. All of me believes that, as strongly as I believe anything." Wenziger looked again at his watch and grimaced with concern.

Greer could see the tension building on the other's face. "He ought to be here by now. You're not trying to cross me? I hope not, for your sake."

"He's on his way. I think he's wrong—but *suppose* he were right. I had to admit that possibility, even if I didn't believe it. Suppose that Nissom is right, that he is seeing a different and more valid world picture. Could there be a chance—one in ten thousand, even—that he's right?"

"I've assumed all along that there is." Greer had stood up and leaned closer to the window. "That's why I can't let him run free. That thousand-to-one shot is too dangerous. Our balance of power analyses wouldn't mean a thing if Nissom's defense screen could be built."

"Too dangerous to you." Wenziger was perspiring again. "To me and my kind, it might mean an end to running. That's why I bought the gun."

"That you'll never use. It takes training to face death, you know. I wondered for a while if you'd find the idea of killing both of us easier to take. Then I decided you couldn't even manage that. You can't face certain death, a hundred percent guaranteed. You're not unusual. When we send men on a suicide mission, we always try and build a long shot that they could get out alive. Otherwise some of them can't take it."

"I thought of a double killing, you, then myself. It was no good." Wenziger's breath was fast and shallow. He seemed hypnotized by the moving sweep of his watch. "I called Nissom. I asked him if a certain kind of test of his theory were possible—a crude one."

He confirmed it."

"You mean you could do a test? Damn it, a minute ago you were telling me that tests would cost billions. Are you saying that's not true?"

There was a long silence. When Wenziger spoke at last his voice was so soft that Greer could hardly make out the words. "You make me over-simplify, then you are angry at the result. A real test—a *full* test—of Nissom's ideas, with all their subtleties, would cost billions. But a test at the grossest level, one that was qualitative more than quantitative, that could be done cheaply. Nissom confirmed it, but he was not interested."

"You mean you could prove if Nissom's right or wrong *cheaply*?" Greer had seized Wenziger by the arm, straightening him up in his chair. "Why the hell didn't you tell me that? If you're trying to cross me it's all over for you."

"I'm not crossing you. It would be a crude test. Let me give you an analogy. The atomic bomb could be thought of as a test of Einstein's theory of special relativity, but it would give no detailed measurements, nothing for exact confirmation." Wenziger sighed. "You saw through me, General. I could never pull the trigger on final doom, for you or for me. But I would accept a *statistical* risk. We live with those every day, when we cross the street or leave our apartment. Do you understand the process of radioactive decay?"

"Of course I do." Greer shook him. "Wenziger, don't change the subject. What in God's name have you been up to?"

"In a group of a trillion radioactive atoms"—Wenziger's voice had become calm and professorial again—"some will disintegrate in the next twenty minutes. But which ones? We cannot say. That depends on fate—or on Laurance Nissom's hidden variables. You see, for certain situations—Nissom can

specify some of them—his theory predicts radioactive breakdown of certain atoms faster than conventional theory.” He stared at his watch face. “I have been here now for twenty-eight minutes. The odds are getting worse. You see, General, I could never have dreamed up Nissom’s theory. Never. But I am not stupid. From that theory, I can certainly calculate probabilities.”

He smiled, a thin-lipped crack in the old, grey face. “So I decided that we ought to let the statistics make the decision. I have primed a bomb—a small one, as those bombs go—to explode if decay from a radioactive source that has been subjected to certain resonances reaches a certain level. According to conventional theory, that level will be reached with fifty percent probability in one hour. According to Nissom’s theory, fifty percent probability was reached eight minutes ago. When he drives over that hill”—he nodded at the road outside the window—“I will disarm it.”

“Damn you, Wenziger, you’ve gone mad.” Greer’s face was white. He rushed to the briefcase and turned it upside down. A torrent of books and papers poured out onto the rug. “The bomb. Where’s the fucking bomb? Wenziger, tell me, I’ll keep you out of trouble. I swear it.”

Wenziger was laughing, the tic under his eye distorting his face. “General, General. You have too much faith in technology. Be reasonable. Not even the best scientists have been able to make a zeta small enough to fit in a briefcase—and we know the best, don’t we?”

He picked up the bottle from the window sill. His tension suddenly seemed to drain from him. “Sit down. Have another beer, and have faith in the hidden variables. They will make the decision for us, if Nissom is right or if he is wrong. He should be here any minute now. I predicted that he would arrive

thirty minutes after I did. That is twenty seconds from now—but of course, traffic is another hidden variable, is it not?"

Greer was still on his knees on the floor, rummaging desperately through the briefcase. His face was sweaty. "The car. If it won't fit in here, it *has* to be in the car. You bastard, you armed it before you got out and came up here." His eyes glared with sudden triumph. "You missed one thing, Wenziger, something you didn't count on. *I don't need you to disarm that bomb.* I had three years with disposal and security—I can take it apart in ten seconds."

He threw the briefcase to the floor, jumped to his feet and rushed from the room.

"And you know, General, you missed one thing, too." Wenziger's tone was quiet and conversational, as though the other man were still in the room with him. "I couldn't shoot you, but you confused ruthlessness and courage. I have read Clausewitz—yes, and Machiavelli, too, in the original languages. You and I differ in the uses that we would make of power, that's all."

He lifted the bottle and took a leisurely sip of beer.

It was hot in the car, eighty-five degrees or more. Normally a long drive was pleasant, it gave plenty of time for unhurried thought and calculation, but this time there was too much else to think about.

How much had Wenziger been keeping to himself? There had been disturbing undertones in their last conversation, a suggestion that crude tests were the way to go.

He peered ahead at the long incline, shimmering in the heat. Not more than a mile to go, if the sketch map were right. Laurance Nissom was almost at the brow of the hill when the valley ahead of him lit with a glow that eclipsed the sun.

—Charles Sheffield

Eeny, Meeny, Miny, Mo...

PICK AN ORIFICE

by Gregory Benford



The whole thing was crazy, yeah. Not many kids can make a hundred kilobucks in an afternoon. But it happened.

When you're eleven years old there's not much to do. When they threw together these big, sprawling suburbs, there was plenty of cheap gas and your parents would ferry you all over town. Now it's not so easy. My Mom and Dad both work, so I'm alone all afternoon. And a little guy can't take the creepy buses; they're too dangerous. So I kinda hang around and maybe play football or something. Only there aren't many kids near me—low birth rate, my Dad says—and anyway, this day in October, it was raining. A gray, soggy day.

Ziggy called me up and said he and Jake were fooling around and maybe I could come over. I for sure didn't want to do my homework, 'cause it was a bunch of boring set theory crap. So I went. Riding my bike through the rain.

Jake and Ziggy were in Ziggy's bedroom, Ziggy's big flatscreen 3D was on and Ziggy was typing something into the computer terminal his Dad got him. Ziggy's the math whiz; for him, set theory was easy as breathing.

"Hey, close the door," Ziggy called to me when I came in.

"Yeah," Jake said, "we want some privacy, Matt."

"Privacy from who?" I asked. Zak lives with only his Dad. The rest of the house was deserted. "For what?" I said as I zipped the styro shut and then sat down on Ziggy's bed.

"For this," Ziggy said. He flicked on the flatscreen. The pearly fog thinned. A black and white picture of a woman came on. Pretty, with long legs. She was peering off to the left. She wore a flowing robe.

"Who's she?" I asked.

"A creation of mine," Ziggy said, and giggled. Jake looked mysterious.

"You snipped her from some 3D show," I accused.

"That's how she got started, yeah. You remember me telling you about those new Simuplex codes my Dad's working with?"

"Uh, I suppose so."

Ziggy launched into one of his routines. "You remember—it takes a machine and studies the stresses. You start off with a new design for a grappling arm, say. The computer takes the specs and draws a picture of it for you."

"*She's from Joanna of Deepspace*, though," Jake put in.

"Right. That's 'cause you can reverse the processing, see. Give the computer a thing, and then it studies how the thing will move."

"What strains it will take," I said, trying to speed up Ziggy's explanation. I mean, my Dad's an engineer, too. I know the jargon.

"Check. And I can tell the program what to make the thing do, too." Ziggy looked at me, barely able to keep from laughing.

I frowned. "Yeah, well, I can see that would help you redesign . . ." I noticed the two of them grinning at me. "Hey . . ." I said, thinking.

"A real whizzo," Jake said sarcastically. "Show him, Ziggy."

Ziggy punched a read-in code. The woman began to move. She stood up. She smiled right at us and I guessed she was really pretty old, twenty, maybe thirty. A nice smile. She was still staring at me when she reached up to a clasp at her throat. The robe fell. She wasn't wearing anything under it. She was, well, spectacular.

"Geez damn," was all I could say.

"I can tap in for color," Ziggy said, and her skin became a rosy tan. Green eyes. Dark black hair, so black it had some blue in it. She started turning slowly. A little mechanically, I thought. But then I got, ah, more interested in the general effect, and she didn't seem so awkward any more.

"And 3D," Jake put in.

"Check." Ziggy's fingers talked to the big IBM 5000 upstate and the woman rippled and changed from a flat image to one with perspective. Fully rounded, yeah. Bigger and better than life.

"Man, that's some naked woman," I said sort of stupidly. I was feeling kinda funny about her, feelings I couldn't understand. Something . . .

Jake grinned. "Matt, you got no imagination."

Ziggy typed in for a new programming routine. "I call her Rebecca," he said sort of quietly.

Rebecca began to dance. She jiggled and smiled at us in a funny way. It was hard to believe. I mean, you take a programming chip that tests out how machines work, and just change a few things around, and it can do *this*. Ol' Ziggy really knew his stuff. I was sitting there, watching her move that funny way that I, you know, had seen before but not paid much attention to, and then—

Then this guy walked on stage.

He was naked. And he was visibly interested in Rebecca. I mean, visibly.

Ziggy cackled with glee when he saw the expression on my face. "Here we go, guys!"

Ziggy had guts, that was for sure. He'd named the guy Ralph. Old Ralph was big and hairy and had something Rebecca liked. She kept staring at him, like a rabbit watching a snake, I'd say. Anything Ralph wanted, he got. It didn't take a genius to figure out what they would do next. "The Missionary Position," Jake explained.

Then in a chair.

Then standing up.

We three sat there and watched. Nobody said anything. I knew this wasn't new to Ziggy or Jake. They were still too interested, though, to make any wisecracks. Some things you don't get tired of so fast, I guess.

And me . . . well, for me a lot of it was new. Sure, I'd seen the manuals, and gone to the Becoming An Adult 3D courses they gave at school, and talked to the Life Emergence counsellor, and all that crap. But to see it . . .

"Well, what'll you have next, gents?" Ziggy said, making his eyes revolve around. He was really enjoying showing off his new program. He told us how he'd stumbled on it in the software package his Dad had brought home from work. It was highpowered industrial stuff. "Yeah, I can see," Jake said, and we all laughed a lot. Ralph and Rebecca were still going at it in the middle of the screen. Each of them was staring at the other with fixed smiles. I wondered if that was the mechanical programming or whether people were really like that when they, well, Did It.

"Well, Matt, what do you want next?" Ziggy asked.

"Huh?"

"Some *action*, man. Something for Rebecca to do. C'mon, I'll teach you the program."

Jake said scornfully, "Matt? You aren't gonna get any new ideas out of *him*."

"Oh yeah?" I said, balling up my fists.

"Yeah. Whadda you know?"

Ziggy looked at me. "Plenty," I said.

"Okay, try to do better than we did," Jake said.

So I did. I knew we were all bluffing each other about how much we knew about this stuff, but that didn't make any difference. Each of us was afraid to admit that. So I tried to think, while Ziggy was explaining how you punch in for certain motions, describe the way the hands and legs and stuff are supposed to go, and set the timing so they do it right, and so on. Then he turned the console over to me and I sat there, kind of scared. I was just a *kid*.

I mean, after you have them do it the way dogs do, and maybe a few other positions, what is there? But then I started to think.

The first idea I got was about the bicycle. That worked out really neat.

Then I thought of the hanging plants, and about swinging around with them, and a lot of acrobatic stuff. Then the pets. Cats. Dogs. Horses. Then *two* bicycles. And the vacuum cleaner.

Right about then it occurred to me that I could speed them up and slow them down. And *that* gave me some other ideas. Ol' Ziggy and Jake were sitting behind me, watching, being awfully quiet. Once I got into it, the ideas came pretty fast. I smiled to myself. I'd for sure shut up Jake, for good.

By the time I started in to adding another woman, Ziggy got pretty fired up. He really liked some of the stuff I'd done. He started talking about how somebody who wasn't so tied up with the software could maybe use it with more freedom, or something like that. I wasn't listening. I liked making up new ways to Do It, not talking about programming alternates and repetition-group translations and guff like that. Ziggy kept talking. Jake just sat there like a stuffed doll. His eyes were glazed, sort of, and he didn't take

his eyes off the screen. I smirked at him. "So I didn't know nothin', huh?" Jake didn't answer me, so I went back to programming. That was when I thought of the swings. That led to the birds with the organs. After them, I put in the special animals. Ziggy got the basic designs out of an old zoo 3D he had in chip storage. I took the lions and giraffes and so on and fixed them up. We went back and found that *Becoming An Adult* stuff was on library access, so we recalled it, and snipped stuff out. You know, to get the parts right and all.

I put in the water stuff then, and the fountains. It was Ziggy's idea to use some skydiving 3Ds his Dad kept. We were busy with that, trying to figure out how it could all fit together, when there was this little sound from behind us. Ziggy and I were typing away at the console. We didn't hear. It was Jake who turned around first.

Ziggy's Dad was standing there. He didn't say anything at first. He just stared, kind of bug-eyed, at the flatscreen.

I thought he might get mad, sure. But not *that* mad. After he sent us home with just a tight-lipped, "You're excused, boys," he really laid into Ziggy. You could hear him from where Jake and I were, outside in the rain.

That would've been bad enough. But then he called up my parents, and Jake's mother, and . . . well, I dunno what he said, but it was more than enough.

My parents got that concerned, warm look on their faces, the way they think they're supposed to, and we had one of our talks. I ended up going back to the Life Emergence counsellor again, for more crappy sessions. So did Ziggy and Jake. Boy, did I hate those. All the kids do.

It wasn't until a month later that Ziggy found out the counsellor had a chip memory of our stuff. He was

using it to decide on our "therapy", they said. That's how somebody at the Center got a copy. For study.

He showed it to some friends.

One of the friends was an executive in the 3D business.

Ziggy and Jake and I didn't know that once you've put something into chip memory, it has what's called a "copyright". So it's *yours*.

That was the only reason Ziggy got a phone call on that Wednesday, asking him to sign a contract, or have his Dad sign it for him. And his Dad wouldn't. But when he heard about the money, things were different.

What made me mad was how we couldn't stay up to watch even a piece of our own show on the adult closed-circuit channel. I had to go to bed, my parents said. That stuff wasn't right for a little kid like me to watch.

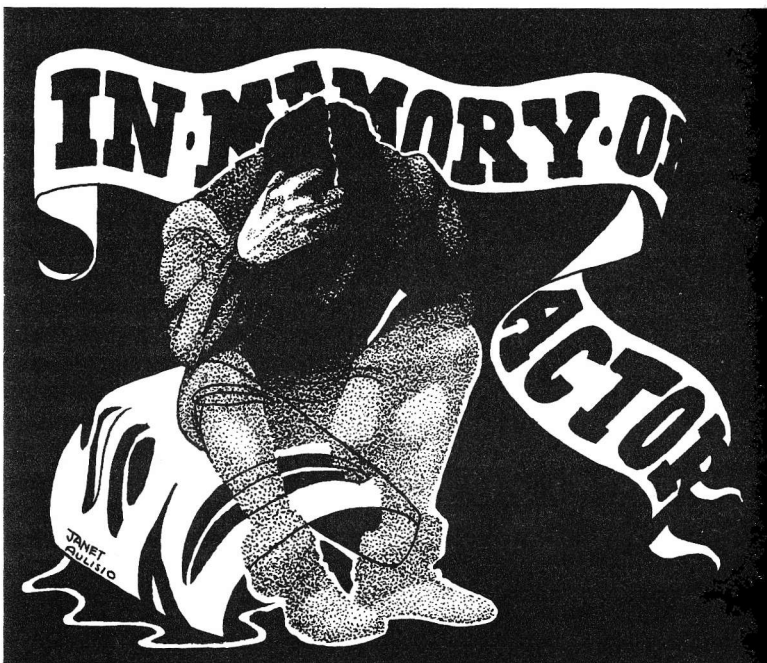
So it was years before I caught a rerun. By that time my third of the hundred kilobucks had started paying for my university education. But I dropped out of there early. I'd been using the fantastic image-processor I bought with some of that money—it helped with the taxes, y'see. Using that, I got in at the forefront of the whole revolution. It worked out fine.

The only thing I'm sorry about is how it sank the whole movie-making business. Of course, it wasn't *our* fault—not Ziggy and Jake and me. Somebody would've thought of it, anyhow. When it got so you could hire a couple of models and a costume designer, and then have the computer make up hundreds of similar images—well, then shooting crowd scenes and all gets to be a snap. The image-processor revolution started that way. Then it moved on to the lead actors themselves. Why hire an actor to do the whole movie, when the computer can study him for ten minutes, watching him move and talk, and then do it all? Feed in the shooting script, type in directors

instructions, and next morning the whole movie is in the can. Like I say, it had to happen. I just sort of wish it hadn't happened so fast. A lot of big movie stars blew their brains out over that.

And I suppose, even after all that's happened, there's still one more point that irks me. Nobody told me the Life Emergence Center was using our show for therapy on little kids, until I caught it on my biannual royalty report. I checked into that. I found out they're just showing it to the kids straight, without explaining anything about how it was made. They don't realize that *Pick An Orifice, Any Orifice* was kind of sexy for us, when we made it. They just say very solemnly that it's a great work of "natural art" and all that, and how it was the show that won the first Oscar ever given to a kid for a comedy.

—Gregory Benford



THE DAY THE SKY BURNED

by G. Harry Stine

**THE AMERICAN PRESIDENT
HAD LONG BEEN DERIDED
BY THE NATION'S PRESS FOR HIS
APPARENT INABILITY TO ACT
RAPIDLY AND DECISIVELY.**

As the Earth turned slowly and the Sun rose over lands to the west and set over lands to the east, it was just another day in the lives of the billions of people on Earth.

But it's unfair to consider the human race as a mass of undifferentiated organisms. Each human being's an individual different from any other human being among those billions. And each person went about life as usual. There were the commonplace incidents of personal violence—murders, beatings, robberies,

torture, accidents, and disasters. But there were also the activities of peace—love, helpfulness, friendship, the playing of children in the bright sunlight, and the rational competition of business and trade. Ships of peace and war sailed the high seas—more ships of peace carrying the cargoes of the world than ships of war. Ships of the air also cleaved the sky ocean, bearing people and goods to the remote areas of the globe where neither rivers nor roads penetrated. People dug into the Earth for raw materials; others preened the Earth to produce food. People worked, and people played.

The beaches of the oceans of Earth held their usual quota of scantily clad humans exposing as much skin as possible to the warm rays of the Sun. The attractive sunbather on the Riviera or the Playa del Sol or Miami Beach was not only watched by people nearby, but also from afar.

In fact, *everything* on the surface of Earth was being watched from above . . . through thick cloud layers, urban smog, and salt haze.

A mere 150 miles from everything and everybody, something watched.

In fact, hundreds of them watched constantly, minute by minute, relentlessly every hour of the day.

Nothing escaped their powerful, inhuman optical sensors, devices so powerful that at a distance of 150 miles their workings could make out the cards in the bridge game being played in Patriot Park in Phoenix during the lunch hour.

Some of these devices “saw” as human beings would see, using light in the visible part of the spectrum. Others looked and responded only to radiation in the heat or infra-red part, watching not only factories, refineries, aircraft movements, submarines, and truck convoys, but also searching patiently for the white-hot flare of rocket exhaust that would signal the launch of either a space vehicle or a ballistic

missile armed with thermonuclear holocaust. Still others looked for the tell-tale signs of nuclear activity—gamma radiation, for example—that identified not only the scattering of nuclear electric power plants but also processing factories for nuclear materials. And yet another type searched the electromagnetic spectrum for radio, radar, and other electronic signals.

If General Motors had wanted to know what next year's Ford cars looked like, the data from these eyes in the skies would have revealed the information to the GM executives in sharp and precise detail, including the shape of the hood ornament.

For over a decade, the skies of Earth had been open skies because hundreds of military reconnaissance satellites endlessly circled the Earth in the company of the weather satellites, earth resources satellites, communications satellites, and scientific satellites. Each year, dozens more were launched, some to replace malfunctioning satellites already up there and to provide a new look at the Earth with better resolution or faster data transmissions.

These reconnaissance satellites were the modern military scouts and spies. They worked for only three main military forces—the Free World or NATO block, the Soviet Union or Warsaw Pact block, and the People's Republic of China.

With powerful radar units, each of the three military powers kept track of not only their own satellites, but those of everyone else as well. From the characteristics of a simple single pulse radar return, analysts could determine the size and general shape of each satellite.

In some cases, the data obtained by the satellite was returned to the ground by a radio link . . . and every beep and blurb of these telemetry signals were recorded by everyone. Some of these data transmissions had been decoded by the "other side" so that

experts knew what the "other side" was seeing. But some radio transmissions were so complex and so carefully encrypted that the code could not be broken.

And some satellites recorded their data on board, ejecting the tape or the film in a small re-entry capsule on each orbital pass, a capsule that would land in a predetermined spot where military intelligence teams waited to pick it up, rush it to the data center, and extract its information.

All this mass of data was handled through one major center in each military block. From there, it was disseminated to government, military, and diplomatic leaders.

What an incredible amount of data came to Earth every day! Literally billions and billions of items of information, enough to be able to keep track of individual automobiles all over the world if necessary. Most of the data wasn't used. And it would be impossible to store and evaluate it, dissecting the important military portions, without the help of large, complex, high-speed computer systems. The United States had perhaps the largest and most reliable of these computer systems working with an incredibly large and complicated communications system that linked its partners and their computers together in one monstrous network of shared data. The Soviet computer complex was not as extensive nor as advanced; there were still many humans involved in the system. As for the Chinese, their data storage and analysis system was rudimentary with far more people involved and far less electronic computer power available.

In addition to the recon satellites, there were other military satellites poised in orbit as well as military space systems waiting patiently on and under the ground below.

The UN treaties on the use of outer space that had

been adopted and signed in 1963 and 1966 were still in force and being observed. There were no orbiting hydrogen bombs waiting to be targeted against cities and military installations below; weapons of mass destruction based in space were prohibited by those treaties, and all three military powers chose to abide by the treaties—not because of world opinion should they be caught in violation, but simply because none of them *needed* to base their weapons of mass destruction in space. Those weapons waited patiently in deep holes in the ground where it was easier to get to them for maintenance and repair. In addition, the guidance systems of those hidden ICBM's and IRBM's were simpler, smaller, and lighter because they not only "knew" where their ultimate target was, but also where they would be starting their flights.

Other nuclear-tipped missiles rode stealthily inside hundreds of submarines on the high seas, submarines whose locations were difficult to pin-point with the sort of accuracy required to knock them out of action.

Some of the underground silos contained rocket launch vehicles that were the satellite killers, the interceptors, the missiles designed to rise above the atmosphere and destroy or disable the enemy's recon and communications satellites in the opening moments of a war.

Not all of these deep space attack weapons were in holes on Earth. Some of them hung from pylons under the wings of supersonic aircraft waiting, ready to go, under shelters near runways where the ubiquitous recon satellites of the enemy could not see them.

And there was something new and different up there in space, a series of satellites orbited by the Soviet Union. They were in typical orbits used by the Soviets for non-military weather and resources satel-

lites of the "Cosmos" series. They were big and possessed very large panels for the collection of solar energy. Western military intelligence experts knew these new Soviet Satellites were armed with particle beam weapons (PBW) and high energy lasers (HEL).

This was no abrogation of the UN treaties by the Soviet Union. The strange satellites were indeed armed with PBW's or HEL's. But such weapons were not weapons of mass destruction; they were weapons capable of such precise aim and selectivity that a single naval ship, airplane, or armored vehicle could be singled out and destroyed by an HEL. For over a decade since American recon satellites first spotted a very large building near Smolensk deep in the USSR, the Soviets had been experimenting with nuclear particle beam weapons and had finally achieved the point in their development of the technology that a powerful beam weapon could be stuffed into a satellite with a size and weight capable of being launched by Soviet space boosters of the "Proton" or "Zond-D" type. Western radar and intelligence experts also watched while several of these large payloads were automatically brought together by the Soviets in orbit under remote control, resulting in very large satellites indeed.

These PBW satellites were something right out of science-fiction. They were ray guns. They could zap a target in space with a concentrated beam of electrons, protons, or neutrons. The PBW satellites were not effective against ground targets because the Earth's atmosphere blocked their particle beams. But the HEL weapons were capable of reaching the surface with a stunning concentration of energy.

The Americans had knocked down aircraft at a distance of dozens of miles or burned holes through armor plate at a distance of more than a mile long before 1980. But there had been very little discussion about high energy lasers or particle beam weapons in

the US except some speculation in both the aerospace trade press and in some science-fiction magazines. The national news media in the US was, as usual, ignoring technology in favor of the more "human" events such as murder, rape, looting, strikes, and other assorted forms of violence. To the American public, space was an expensive place where scientists went to play with their hobbies. The American taxpayer was continually reminded by liberals in the news media and in politics of the extravagance of spending billions of dollars—about 0.5% of the gross national product—on this "useless waste of taxpayers money."

Most Americans were proud of their former accomplishments in space. But because the US had beaten the USSR to the Moon in 1969, it was announced that the space race was over and that tax money should be spent on other, more important problems on Earth, the pet projects of somebody else.

These announcements to the American taxpayer were made using communications channels through orbiting communications satellites.

So most people going about their daily affairs on Earth didn't know what was in the sky. Many of them didn't care. Most of them didn't understand it because few people could have explained something as elementary as what keeps the Moon from falling.

If they'd known, if they'd understood, or if they'd been told, they might have done something.

They might have prevented Space War I.

When it started, it happened so fast that there was no time to do anything but let it run its course.

In some ways, it was like the start of World War I all over again. People acted on incomplete and inaccurate information filtered through too many intermediate steps. The information was outdated by the time they got it, and by the time they reacted, it was too late to stop what had already taken place because

something totally different was then happening.

What little we know about the start of Space War I has been garnered from the American records because they had the best system of command, control, and communications. The Chinese had the worst, and the Soviets were not much better. The Soviets and the Chinese had concentrated on the development of weaponry; the Americans, aware of the consequences of warfare using the weapons, had expended considerable study, time, and effort in developing and implementing a system to command, control, and communicate. Unfortunately, this outstanding system also was inadequate.

The best thing that the Americans could have done to prevent Space War I would have been to openly share their advanced technology of command, control, and communications with the enemy. But they didn't. So it was back to the classical military system of command and control while viewing the situation through the "haze of battle." It was by guess and by gosh using gut feeling, intuition, guesswork, and preconceived notions that Space War I was fought—Atilla with his mounted messengers trying to battle with nuclear and beam weapons.

The foundation of Space War I rested on old problems. There'd been tension along the 5000 kilometers of common border between the Soviet Union and the People's Republic of China for decades. There were parts of that border that were highly disputed. The Chinese believed the Russians had taken the Amur Peninsula from them unfairly in the Russian imperialist expansion across Asia almost a century ago when China was unable to resist . . . and the Chinese wanted it back.

There'd been a minor border clash between Soviet and Chinese troops between Oblush'ye and Ro-shan. It was purely accidental. Some shots were fired in both directions across the border after what ap-

peared to have been a rather boisterous drinking match by the Soviet troops one night. Several soldiers were killed. As the local commanders met at the border to try to mollify each other, their governments over-reacted.

Insofar as Moscow was concerned, it was an act designed to test Soviet defenses in a place where the Trans-Siberian Railway was less than 20 kilometers from the border and could be severed to totally isolate the Amur Peninsula and the Soviet access to the Pacific through Khabarovsk and then through branches to Vladivostok and Sovetskaya Gavan. The Soviet reaction was to reinforce the entire area with additional troops. This resulted in considerable activity eastbound along the Trans-Siberian Railway, activity that was noticed and followed carefully by both the United States and China.

Peking's reaction was also one of overdoing it. They reinforced all caserns in Heilungkiang Province with additional troops moved up from the south by road. Even the most unsophisticated recon satellites could have spotted the huge clouds of dust from convoys and troops on foot moving toward the border.

The Soviet high command went to the alert.

Insofar as the troops were concerned, it was just another exercise. After all, there were always border incidents.

It was completely accidental that the Soviets chose to launch an SS-19 ICBM out of Tyuratam, their rocket development center near the Aral Sea, in a trajectory that would take it within five kilometers of a Chinese military recon satellite.

To the unsophisticated radar of the Chinese, it appeared that the Soviets were out to kill that Chinese recon satellite. The close approach of the SS-19 to the Chinese satellite took place over Lake Baykal, which was a long way from the Chinese tracking radar at Wu-lu-mu-chi. There were tracking errors as well as

range gate errors in the Chinese radar, and it looked like an intercept by the SS-19. This was reported immediately to Peking by telephone, an operation that took twenty minutes. By that time, the Chinese radar had lost the two targets. If the SS-19 and the Chinese satellite had been tracked out over the Pacific Ocean by the Chinese, it would have been obvious that the SS-19 hadn't killed the Chinese satellite, which was still orbiting . . . but the Chinese didn't know it.

The Soviet Pacific tracking ships spotted the SS-19, watched its MIRV's separate, tracked each MIRV to its ocean impact . . . and totally ignored the Chinese recon satellite. It would be almost an hour before the Chinese satellite would check in again with its ground station near Lop Nor, a report that would tell the Chinese that it was still operational in orbit. But there wasn't an hour to spare.

Peking launched against the next Soviet Cosmos military recon satellite that came over the sensitive border area . . . and their CSI-2 "Heavenly Messenger of Mao" satellite interceptor got the Cosmos satellite in plain view of the radars on the Soviet Pacific tracking ships that were standing by for a telemetry data dump from the Cosmos. It didn't take 20 minutes for the word to get to Moscow; it took only five minutes for the report to land on the Premier's desk in the Kremlin.

The situation along the Amur was touchy. Troops were moving on both sides. The Soviets knew the Chinese were amassing large numbers of troops and tanks; their recon satellites were good, and their data was good. The Chinese interception of a Cosmos recon satellite over the area was a signal that was interpreted incorrectly in Moscow. The interception was taken as a confirmation that the Chinese were on the attack and trying to cover their own troop movements toward the Amur region.

The Soviets fired-up their obital beam weapons.

By the time the Chinese satellite checked in with its owners again, signifying that somebody had goofed in claiming a Soviet interception, the Soviet orbiting HEL weapons were blasting a strip ten kilometers wide inside the Chinese border from Skovrodino to Khabarovsk. Nobody knows how many Chinese soldiers died. But communications along that border back to Ha-erh-pin and to Peking ceased to exist.

In the meantime, as Chinese radar watched, the Soviets activated orbiting killer satellites and went after four more Chinese recon satellites and two Chinese communications satellites, destroying them all.

A Soviet electronic ferret satellite zeroed-in on the Chinese radars tracking the satellite killer activity, thus providing aiming data for a Soviet HEL satellite that promptly zapped the Chinese radars within five minutes. This effectively rendered the Chinese blind on the ground and reduced them to the exclusive use of those recon satellites they still had operational in orbit. But not for long, because with the Chinese tracking radars out, the Soviets then proceeded to launch their ground-based satellite interceptors to get the rest of the Chinese recon and communications satellites.

The Americans were watching this carefully from their warren deep under Cheyenne Mountain in Colorado. No American or NATO satellite had been touched yet. But the President was informed, and Western military forces went on Yellow Alert. Within minutes the presidential helicopter was lifting from the White House lawn with its leadership cargo bound for the Blue Ridge Mountains and the presidential command post there.

A query went from Washington to Moscow via the Hot Line. It never got there.

One of the Soviet satellite interceptors became con-

fused after launch. It went after the commercial comsat that carried the Hot Line link to Moscow. And it got to that American comsat before the Hot Line query was relayed through it.

When Cheyenne Mountain saw it, Western military forces went immediately to Red Alert.

There were now three antagonists involved, and it became very complicated. The presidential helicopter was still in the air en route to the Blue Ridge, and the President elected to wait until he got to the command post with its greater amount of data before he acted on this. The last American President had long been derided by the nation's press for his apparent inability to act rapidly and decisively. However, in the last days of his administration that weakness saved the United States of America in Space War I.

The Chinese didn't know the Soviets had knocked out the American comsat except for the fact that the same comsat was also used for relaying telecommunications between China and Europe. When that satellite link went dead, the Chinese concluded that the Soviets were indeed on the attack and were out to totally isolate China from the rest of the world. The Chinese knew that, for some reason, the Soviet SS-19 had *not* killed their recon satellite earlier, but the meaning of this information was somehow lost in the "haze of battle." The Chinese by this time had lost their tracking radars and most of their recon satellites. They knew Soviet troops were on the way eastward on the Trans-Siberian Railway. And some reports were beginning to come back from Manchuria that soldiers and vehicles were being killed and disabled by strange energy beams from the sky. From the Chinese point of view, they were under attack by the Soviet Union . . . indeed they were.

So they launched their IRBM's against targets in the Soviet Union.

The Americans saw the launches and knew they

were IRBM's as well. In anticipation of a worsening situation, the American President ordered SAC to airborne alert and put the F-15's carrying satellite interceptor missiles into the air.

The Soviets saw this, considered it a potential threat, but had an immediate attack on their hands. They'd deal with the Americans later. As the Chinese IRBM's rose above the atmosphere, the Soviets targeted them with their orbiting PBW's.

The sky over Asia lit up as Chinese IRBM's were exploded by Soviet beam weapons that melted their aluminum hulls and allowed their hypergolic liquid rocket propellants to mix and ignite.

None of the Chinese nuclear warheads was detonated by this initial beam weapon attack. In the resulting debris that filled the skies over central Asia, the Soviet radars could not discriminate the nuclear warheads from the shattered remains of the Chinese IRBM's. Nor could the Americans, watching the scene through their military satellite network.

Working desperately, the Americans and the NATO nations managed to patch together a make-shift Hot Line to Moscow using commercial land-line and microwave networks across Europe and the still in place but largely forgotten transatlantic cables. The message went to Moscow to the effect, "We're watching. We're ready. We'll stay out of this in spite of the fact that you've destroyed one of our comsats. But we'll get involved if you make any other hostile move against us."

The Soviet Foreign Ministry, who was not aware of the complete situation, replied that they had no information about the destruction of an American comsat and regretted the fact that the Hot Line was temporarily inoperative due to equipment malfunction. Their message went back to the U.S. Embassy in Moscow and got through to the Blue Ridge presidential command post.

But the Soviet high command didn't believe the Americans. After all, the Americans had continually waffled in international crises since the Cuban missile crisis of 1961. Insofar as the Soviet leaders were concerned, the US was a toothless tiger that they'd handle easily once they'd put the Chinese in their place.

In the meantime, the Soviet beam weapons were busy. They picked off the largest pieces of the debris of the Chinese missiles. They missed a few warheads, and these landed astride the Sino-Soviet border. Some of them had armed on lift-off and survived the beam weapons. They went off on impact. They were dirty. We'll never know how many thousand Soviet and Chinese soldiers and civilians died both from the initial detonations and from the resultant fall-out that drifted eastward into China on the prevailing winds.

The remaining large chunks of debris were tracked by the Soviet ABM system. When the pieces entered the atmosphere, the Soviets made a final attempt to get them, expending most of their Ural-based ABM forces, emplaced in covert violation of Soviet-American agreements in order to protect their industrial base in the Urals. (But American intelligence knew of these ABM units from recon satellite data.)

Space War I was over in about six hours. The Soviet Union, with its recon and comsat space systems intact, plus their incredibly powerful space beam weapon systems, had the People's Republic of China at bay. Soviet troops did not have to invade China, leaving their western front open to possible NATO attack, which the Soviet High Command feared. No Chinese soldier, truck, tank, or airplane could approach the Sino-Soviet border; the space HEL weapons singled them out and zapped them, one by one. Six 50-kiloton Chinese nukes had detonated on the ground astride the border; hundreds more went

off in space under Soviet beam weapons attack. The resulting nuclear debris upset the ionosphere for several weeks and made long-distance radio transmission difficult.

When the smoke cleared, China was figuratively on its knees, isolated and out of touch with the rest of the world. The Americans had all of their defenses intact on the Earth and in space save for one comsat.

The Union of Soviet Socialist Republics then turned to the rest of the world and, in effect, said, "All right, we've got the drop on you. You've now seen what we can do with our beam weapons in space. You're at our mercy. Throw down your guns . . . NOW!"

* * *

Fortunately, this is just a "scenario" or an educated guess of what a space war would be like in the 1980-1990 time period. It hasn't happened, but it *could* happen. If people do not become aware of the potential of using outer space for military uses as well as for peaceful scientific and industrial uses, we may well be on our way to permitting Space War I to take place.

Although the scenario is fictional, it can occur because all of the space systems are either already up there or can be put up there within a matter of a few years. Because of the possible consequences, all of us need to become more aware of the military implications of space so that we may move in directions to prevent them or, at least, to reduce their possible impact on our lives.

What are the possibilities of death rays and other beam weapons in orbit around the Earth?

Will there be hypersonic orbital bombers based on current Space Shuttle technology?

Will there be space forts?

How about PBW's and HEL weapons in orbit?

There have been tantalizing peeks and glimpses of these and other possibilities in various magazines and newspaper articles over the past several years. The SALT II testimony given before congress is both revealing and frightening because the military activities of several nations now include orbital space.

There have been several United Nations' treaties covering aspects of military operations in space, but these treaties are in many ways extremely vague and can be interpreted in many ways. The treaties prohibit nations from using the Moon and other celestial bodies as a base for military operations. But a celestial body is a very poor place to put a military base anyway. The treaties also forbid the emplacement of weapons of mass destruction in space.

But modern beam weapons are not weapons of mass destruction and can be pin-pointed with great accuracy against individual targets as small as an automobile.

But isn't all this "far-out Buck Rogers' stuff?" Not at all! The technology to permit extensive military operations and activities in space is either in place today or is forecastable and can be in place within the next quarter of a century. The implications are profound.

Are we doing anything about it?

The US Department of Defense apparently has no interest in space warfare since it's using or developing only unmanned satellites for reconnaissance and communications purposes. DoD is also developing a "satellite interceptor" missile, having finally awakened to the fact that the Soviet Union has deployed "killer satellites" capable of hunting down and destroying our own recon and communications satellites.

But when it comes to beam weapons in space, manned military space activities, and development of space warfare doctrines, the United States military

planners appear to be far behind their counterparts in the Soviet Union.

To the author's unclassified knowledge, there is nothing beyond unmanned satellites and satellite interceptors currently under consideration by the United States. There is some highly classified research work being done at Los Alamos Scientific Research Laboratories and at the Sandia Corporation in New Mexico, among other places. But to the best of anyone's unclassified knowledge, this is merely research with no intentions or funding at present that could give the US an orbiting PBW or HEL capability in the 1980 decade. Because of the Presidential order to concentrate on the Space Shuttle as the prime US space launch system, the Air Force has been forced to eliminate expendable space boosters from its planning; once the current inventory of Atlas-Centaurs and Long-Tank Thor-Agenas is gone, there will be no more unless the US buys Delta boosters from Japan (the US gave the Japanese a license to build this reliable US space booster). The USAF is extremely reluctant to abandon the only current US heavy-lift launch vehicles, the powerful and reliable Titan-IIIC and Titan-IIIE.

Nobody seems to be interested in the coming age of orbiting beam weapons.

Or, if they are, they're not talking.

In the 1980 decade, the military organization of the USSR will have routine and easy access to orbital space around the Earth out to geosynchronous orbit. During the 1980 decade, the USSR will certainly continue to develop their own completely reuseable manned shuttle system; they are already flying a small, one-man, 39-foot-span shuttle vehicle in unmanned flight tests, lofting two shuttles on each flight with a single SL-12 "Proton" or "Type D" launch vehicle. By the end of the 1980 decade, the USSR will undoubtedly possess an inexpensive and

completely reusable space shuttle system that will eventually replace the expendable but reliable Soyuz and Proton launch systems of 1980.

In the 1980 decade, the US will have one manned space launch system, the Space Shuttle, which is, in reality, a joint NASA-DOD program. Few people know that the Shuttle is a joint program. Few people remember that NASA wanted a straight-wing Shuttle Orbiter because of better entry stability and heating conditions and improved landing characteristics; the USAF requirements dictated the adoption of the delta-winged Orbiter with higher cross-range capability but more severe heating and landing characteristics.

The Space Shuttle system may have the capability to put an orbiting PBW and HEL system in place except for one important and overlooked factor: there are only *four* Space Shuttle Orbiters currently planned! The fifth Orbiter, the much-heralded *Enterprise*, would require extensive re-work to qualify it for orbital flight because it's overweight; it may end up in some city park or exhibited on the Mall in front of the National Air & Space Museum in Washington! NASA has sold the first 41 Shuttle payloads. In order to justify the Space Shuttle program to the Office of Management and Budget of the Executive Office of the President, NASA had to plan and justify every one of the more than 500 flights planned in the 1980 decade. There would have to be a serious revision in NASA plans and OMB approvals to accommodate any launches of components of an orbiting beam weapon system.

So, in 1980, it appears that the US is going to come out on the short end of the deal, facing the possibility of finding its ICBM and submarine ballistic missile forces rendered totally obsolete by the technology of orbiting PBW's and HEL's. There's no discussion of this eventuality. And there are no apparent plans to

do anything about it. Perhaps it's so highly classified that only a few people know about the US orbital beam weapon program. More likely it's the classical American response of doing little or nothing until it's absolutely necessary.

For the sake of our lives and those of our children, of the security of our homes and businesses, of the existence of our political and economic system, and of our personal freedoms, one sincerely hopes that it's the former, that there is somewhere in America the Top Secret orbital beam weapon project planned for operational deployment in this decade.

Even recognizing the importance for national secrecy with respect to actual hardware programs for space warfare, the implications of the military use of space are of such importance that they must be discussed and debated openly in public in much the same manner that Herman Kahn initiated public consideration of thermonuclear warfare in 1960 when it was a *verboten* subject for discussion outside a circle of experts and when the exact details of the hardware were, as they still are, secrets.

Once Kahn brought the subject of thermonuclear warfare into the open, people could discuss its implications and work out options should a thermonuclear confrontation occur—as it did indeed during the Cuban missile crisis in October 1961 when, basically, World War III was averted.

It would indeed be a wonderful thing if nationalism stopped at the stratosphere. But it hasn't. Therefore, we'd better be prepared for it, be thinking about it, and have some options worked out concerning what to do when other nations make military use of space as they already have and will certainly continue to do.

To quote Will and Ariel Durant, "War is one of the constants of history, and has not diminished with civilization or democracy. In the last 3,421 years of

recorded history only 268 have seen no war . . . In every century the generals and the rulers (with rare exceptions like Ashoka and Augustus) have smiled at the philosopher's timid dislike of war."

If we heed the warning of these esteemed historians, and if we do something about it, the ending of Space War I could be quite different:

* * *

The American response to the Soviet demand for a *pax sovieticus* was immediate, swift, and calculated.

From more than a dozen military airfields in the continental US, strange black aircraft rolled out of concealed shelters onto the runways and took off, climbing to space. Fifteen minutes after the Soviet demand, 109 American SHB-2 *Starclipper* hypersonic dip-bombers were orbiting the Earth in widely different orbits and widely different orbital altitudes. They were loaded with electronic jamming and countermeasures equipment; radars had difficulty finding them, staying locked on them, or identifying them because, out of silos in the American West came salvos of orbital decoys, missiles carrying other electronic equipment to confuse and overload the Soviet radar and orbital targeting systems.

The *Starclippers* were the result of technical spin-off from the much-maligned NASA Space Shuttle program. They had been designed, tested, and built in the total secrecy of a "skonk works" operation. Utilizing dual-mode scram-rockets, they were designed to take off and land from standard military air bases. They were small, carrying only two crew members, but had the capability for an operational load of a thermonuclear weapon, a beam weapon, or highly advanced electronic warfare equipment. They could enter any near-Earth orbit and had the ability to change orbits. Their appellation, "dip-bomber," alluded to their ability to make a rapid and brief hy-

personic pass through the upper atmosphere; this rendered them immune against PBW attack during the pass. Their ability to randomize orbits and institute unprogrammed high-altitude hypersonic passes made it exceedingly difficult for computer-guided ABM's or beam weapons to be launched and aimed against them.

On the ground, some very ordinary-looking industrial buildings suddenly rolled back their roofs. Ground-based American HEL's pointed skyward. They were powerful, obtaining their energy from the electrical power grid of the US rather than having to rely on the limited energy available from solar energy panels in space.

In near-Earth orbit, the principle of the "high ground" or the naval "wind gauge" doesn't apply. Power, speed, maneuverability, and the principle of surprise dominate. The Americans used these space military doctrines. The USSR orbital beam weapons required more time to aim by remote control from ground stations; the manned ground-based US HEL systems could be aimed and fired rapidly at USSR targets moving in their predictable orbits, and the US *Starclippers* simply overwhelmed the limited Soviet computers and command and control systems.

The US reply to the Soviet demand took two forms: (a) a ground-based US HEL warmed a Soviet orbiting PBW satellite to the point where, in three seconds, the Soviet telemetry could detect the temperature rise; and (b) the low-altitude pass of a USAF *Starclipper* over Moscow at Mach-10 not only completely avoided the Soviet air and ballistic missile defense system, but broke every window in the Kremlin.

The US government used the Hot Line to express its regrets for this overflight incident and to offer to replace the glass.

Space War I was over.

—G. Harry Stine

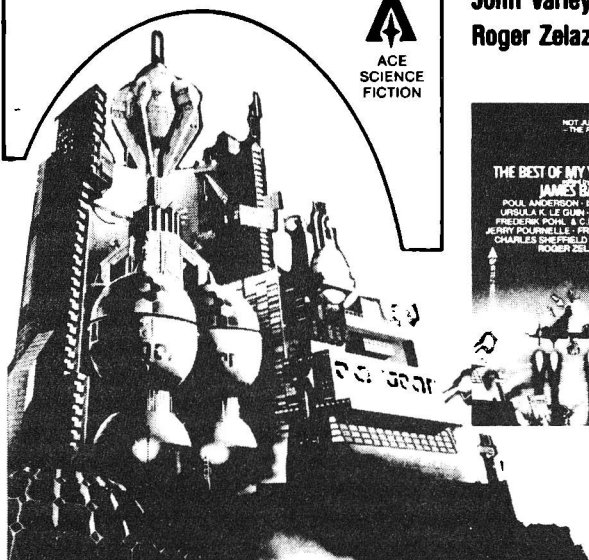
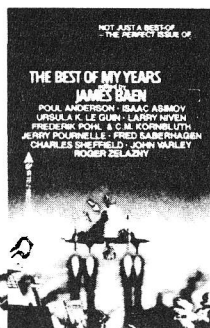
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ON PREDICTING THE FUTURE: THE WIZARD WARS

by Frederik Pohl



THE MX RACETRACK PLAN HAS
A PRICE TAG OF \$33 BILLION.
THAT MAKES IT THE SINGLE
LARGEST CONSTRUCTION PROJECT
IN HUMAN HISTORY.

As I write this I am in a hotel room in the middle of one hundred thousand of the flattest square miles in the world, and I've just had dinner with a college professor with an ashen face. The other day he got a conducted tour of a missile silo.

Like all of us, he knew they were there. There are dozens of them between me and that distant, flat horizon right now. But he had never been inside one, and as he was describing the elevators and the hardened lids and the big hot-nosed phallus itself, and especially the men who served them all, his face turned white and he did not finish his wine. Up until then it had been theory. Now he had touched and smelled and seen. He simply had not understood, until then, that the fellow down the road from his house, with the teen-age daughter who went to school with his own kids, was part of a round-the-clock team of highly trained technicians whose life careers had no other purpose than to be ready, at any moment, to end the lives of some half a million other men, women and children in another city thousands of miles away.

So I came back up to my hotel room and turned on

the TV news. I wasn't watching very attentively. I was thinking about a certain curious fact, namely that the team a few miles from where I sat, taking dead aim on some point in the Soviet Union, was matched by some other team of bright, exemplary men and women somewhere in the Urals or just outside of Volgograd, taking dead aim on us. We are always right in the cross-hairs of someone's sights. All the time.

Among my plans for this series of essays on the various aspects of the future, I had always been intending to write about war, particularly about the wizard weapons that we keep hearing about, the particle beams, the neutron bomb and all the other marvels that you and I are paying for. This seems like as good a time as any. Especially since the network news has just told me that, for the second time in three days, a computer malfunction in our early warning system has "detected" a Soviet missile attack launched against the United States, and so our entire retaliatory forces flashed to a state of readiness to go.

Since the end of World War II the human race has spent more than \$4,500,000,000,000—that's four and a half *trillion* dollars—on what is called "defense," about a third of it by the United States. The average American family has about a \$20,000 investment in the Department of Defense. In dollar terms, it isn't a big money-maker. Much of it was paid in the harder dollars of the 50s and 60s and 70s, so that its present cash equivalent cost is much higher, and by far the greatest part of what it bought has been either used up or written off as obsolete. But it sure represents a growth industry. One single DoD project now on the books, the MX racetrack plan for putting missiles on tracks and hiding them away, has a price tag of \$33 billion. That makes it the single largest construction project in human history.

In the vocabulary of warfare it is customary to distinguish between "strategic" and "tactical" weapons. It is also customary to draw a line between the "bad" weapons, which are the usual subjects of international agreements to refrain from their use—such as chemical and bacteriological weapons, and at least some nuclear ones—and the "good" weapons like swords, guns, land mines, tanks, bombs and so on which are hallowed by generations of widespread use. The late Admiral of the Fleet the Earl Mountbatten put the case for the good-bad division most clearly when he said, "The nuclear arms race has no military purpose. Wars cannot be fought with nuclear weapons. Their existence only adds to our perils."

Of course, Mountbatten was not a serving officer when he made those remarks, at the International Peace Research Institute in Stockholm in 1979, and there's some irony in the fact that his own life came to an end shortly thereafter from much more primitive weapons in the hands of some Irish guerrillas. Most flag-rank officers who have come out for nuclear disarmament are well retired. If they held any such opinions while on active service, they kept them to themselves.

These distinctions are pretty silly, practically speaking. The difference between a "tactical" nuclear weapon and a strategic one is arbitrary. "Tactical" is supposed to have limited range and somewhat smaller explosive power than "strategic," perhaps with a range up to 150 miles and a one-kiloton blast. I cannot believe that these limits would ever mean anything in practice. I cannot imagine any commander in the heat of battle who would fire a nuclear round at a tank concentration 140 miles away, and not at one 160 miles away. In fact, I can't believe that any weapon will fail to be used to the limit of its capacity whenever the urgency is great enough—

which is to say, any time your side is losing. It is true that chemical weapons could have been used all through World War II and were in fact withheld. Part of the reason is that gas is most useful in situations of static trench warfare, and there weren't many of those in World War II. The other reason, I think, is that they were not in the hands of field commanders who were actually getting licked.

So I do not think the distinctions will mean much in any real war. However, they have a use. If we separate out the "strategic" weapons and the "bad" weapons we can save a lot of discussion, because about those two categories there is not much to say. If they are used against you, you will be dead. That's all there is to it. There is no real defense against a nuclear missile, and, in your lifetime and mine, there isn't going to be. There isn't much defense against chemical or biological agents, either, but you probably need worry less about them because they are impartial. They are almost as dangerous to the side using them as to the targets, and the other side doesn't have any good defense either.

So the "wizard war" is not going to have a great many surprises—except maybe the terrible surprise of discovering that it is happening. It may not even have all the surprises that have been announced. It is especially unlikely to have the two I've already mentioned, the particle-beam weapon and the neutron bomb.

This is a bit of a disappointment, particularly to those of us who grew up on science fiction. We're used to the idea of super-technological wars—at least in fiction—all the way from Wells's heat rays and the multicolored zapping beams of Doc Smith and all the other space-operists to the somber cautions of *On the Beach*.

A weapon is nothing more than a device for delivering energy to a point where it will damage your op-

ponent. Nerve gases deliver chemical energy. A club delivers kinetic energy to a caveman's skull. Of course, anything at all can be a weapon; it depends on what you use it for. You can pick up a copy of *Dune*, or, better for this purpose, *Time Enough for Love*, and bash somebody with it. A paring knife can kill, and many have. So can a diamond necklace, if the cord is strong enough. There are not many inventions or technical improvements in humanity's history that have not become weapons in some way, and some of the mightiest were not planned that way. Mr. Nobel had no intention of making artillery more destructive when he invented dynamite; his eyes were on mining and civil engineering. Meitner, Hahn et al did not plan the nuclear bomb. They were only curious about the way heavy atoms fissioned when slow neutrons raped them. The only thing that clearly distinguishes a weapon from anything else in our world is the intention of the user . . . plus a certain amount of engineering.

But with the best, or most malicious, will in the world, and all the engineering that can be applied, some things make worse weapons than others. The beam weapon is a very poor weapon. Our Defense Department has not yet discovered this and so they are busily engaged in trying to build some.

It is a matter, as mentioned, of delivering energy where it will hurt the opponent. You can send a package of explosive, either chemical or nuclear, to where your opponent lives and it all gets there; all of the energy is delivered close to the target. The particle beam starts diffusing and thus wasting energy the moment it leaves your projector. Kosta Tsipis of MIT says "as any physics undergraduate with a course in electromagnetic theory can show (particle beam weapons) are unworkable even in principle, to say nothing of their chances of working as weapons in a hostile environment of counter-measures." Other

scientists have put numbers into the argument. If you put a beam weapon into orbit, they point out, about the most you can hope is that it will deliver one megawatt of power to the surface of the Earth, where your enemies are. It could kill your enemies, all right. But it would take about sixty days to do it, which is plenty of time for them to walk out of the beam. It is possible that a beam of charged particles might do some real damage to a satellite in orbit, where there is no air to destroy collimation. But so would an explosive charge. And anyway the wars of the next generation or two will be fought not in space but on Earth.

Scratch the beam weapon, then. But at least deploying a particle beam generator would not do our own side any great harm, and that is more than can be said for the neutron bomb.

The first thing to know about a neutron bomb—more politely called the “enhanced radiation weapon”—is that it isn’t very different from any other nuclear bomb. It produces heat, blast and fall-out as well as radiation, and a lot of all of them. The only thing that makes it special is that it produces a higher proportion of radiation than other types. So it is not, by any stretch of the imagination, the dreamed “clean” bomb that will selectively kill all your enemies and leave their cities and machines and farms intact.

It has one special property, though. It is the only weapon I can think of that makes your enemy more dangerous after you have used it than before.

The best way to see the reason for this is to draw some circles on the nearest polka-dotted surface, perhaps your kitchen linoleum. Draw five concentric circles, with radii of one foot, eighteen inches, two feet, two and a half feet and three feet. If you let each foot represent 500 yards, your smallest, innermost circle contains an area representing some 800,000

square yards.

This is your area immediately around ground zero. It is also the only place where the neutron bomb works exactly as advertised, so cherish it. Perhaps you have forty polka-dots in that inner circle. Let each one stand for 100 enemy soldiers, so that you have a combat brigade of 4,000 men, in tanks and out of them, in that area. You have wiped them out. All four thousand of them are effectively dead men. Every one will have received an average of 18,000 rads of whole-body exposure, and so they are either dead or in coma within five minutes. The ones that don't die at once will surely do so within twenty-four hours. None of them will ever fight again.

However, the bomb does not confine itself to that inner circle.

In the ring between the one-foot and eighteen-inch circles you probably have fifty dots, representing 5,000 other men. They're out of it, too, having received some 8,000 rads each, but they may not die for 48 hours. You probably don't have to worry about any of them for long, but a few may be able to function briefly.

Between the 18-inch and two-foot circles (the range from 750 to 1000 yards in the real world) you probably have 70 polka-dots, representing 7,000 men. These are surely dead men, too. But now we come to the real problem. They will take a while to die. They are knocked out in five minutes, even inside a tank. But then they recover briefly. They can operate quite normally for a period of several hours, sometimes longer, before relapsing and ultimately dying within 48 to 96 hours of their 3000-rad dose.

Between the two-foot and thirty-inch circles you have 90 polka-dots, or 9,000 men. They have received 650 rads each on average. At first they are impaired but still functioning. That lasts for a couple of hours, then they begin a slow decline. Most will be dead in a

matter of weeks. The rest will die later, and worse, of cancer.

And between the thirty-inch and three-foot circles you have 110 polka-dots, representing 11,000 men, who have received only 250 rads. For hours or even days they will seem essentially normal. Their fighting ability will be unimpaired. But they are doomed, and they know it. Most will be dead within a few months. Almost all of the rest will never be well again, and will die of their ailments sooner or later.

Of course, beyond the three-foot circle you have a lot of other people, many of whom will also be damaged and some of whom will also die, but not quickly. How many there will be is a matter of prevailing winds and the path the radioactive plume takes. Some of them may well be soldiers, or civilians, on the side that deploys the weapon.

To put it another way, out of every thousand casualties within a radius of a mile from ground zero, about 160 will be knocked out within five minutes, dying then or shortly thereafter.

But about 400 will be killed, and know they have been killed, and still be able to function—which means to fight—for some time afterward.

There is a name for soldiers like these. They are called “kamikazes.”

Most people don't want to die, and so the fiercest attack is blunted by some residual instinct for self-preservation. These people have none. We have had bitter experience of what kamikazes can do. In 1945, when the United States forces had effectively driven the Japanese off the sea and out of the air, a handful of these doomed warriors nearly won a battle against odds in materiel and men of at least a hundred to one. Only a few hundred Japanese participated in the kamikaze attacks. Every time we dropped a one-kiloton neutron bomb on a troop concentration we would be creating perhaps 25,000 of them.

The other thing about a neutron bomb is that it is still a bomb.

It is a one or two kiloton nuclear weapon. Apart from its radiation effects, it will convert a large piece of territory into something that looks a lot like Hiroshima or Nagasaki. The main difference is that the odds are that it would be employed in relatively open territory rather than on a city.

But cities can be rebuilt rather quickly. Farms, forests and grazing lands cannot. A coniferous forest would take *three centuries* to recover completely. Hardwood would take almost as long; tundra, which is exceptionally fragile, even longer. Even grasslands would not become fully productive again for a generation or two.

So the neutron bomb is not very clean—or very desirable on any count, when you take into account its capacity for converting ordinary troops into something like Ali Ben Hassan's hashish-filled suicide squads.

What miracle gadgets are deployed in the next war depends a lot on what sort of war it turned out to be. The scenarios come in all shapes and sizes.

At the low end of the spectrum is an ungainly clump of small-force actions—commando raids, anti-guerrilla measures, and the like. The sort of thing we used to do in more carefree days when we sent a few Marines into a banana republic and civilized 'em with a Krag.

These are not as much fun as they used to be. It all turns up on the television news, so everybody can see what you are doing. Not only your own citizens, who sometimes organize peace rallies and demonstrations; the Other Side sees it too, and in today's highly polarized world the Other Side is always ready to supplement local guerrillas with enough high-tech equipment to make it unwise to use all of your own.

When the guerrillas are in some other country, what you probably need is some sort of invasion force. The Pentagon has quite a lot of technology in stock for this purpose, but it is anxious for more—for several billion dollars' worth of more: the C-X airlift plane, \$6 billion; the T-ARX Maritime Prepositioning Ship, \$3 billion; and a lot of updating and modifying of existing materiel, like the KC-10A Advanced Tanker Cargo Aircraft, a bargain basement item at \$300 million. Among the high-tech items already on hand is the AWACS, the most expensive aircraft ever built. It is nothing more than a familiar 707 jet stuffed with advanced electronics, and it is just what you need for overseeing a commando attack—or, say, an attempt to rescue hostages in Iran. The Defense Department likes the ones it has so well that it wants two more for itself and eighteen for NATO, for a total price tag of several billion.

When the terrorists are in your own country, that's cheaper but harder. A friend of mine, who not only is a science-fiction writer and a college professor but also served a hitch as a CIA spook, once started to write a novel about how World War III would come about. It began in the suburbs of Pittsburgh, Pennsylvania, with terrorists harassing the city government, and quickly escalated and spread. My friend abandoned the novel when he realized he was writing a primer for terrorists. His restraint does not seem to have solved the problem, though. Now, more than a decade later, the terrorists are fully capable of writing their own texts. Like other guerrillas, they are sometimes supplied out of the Other Side's national armories and thus have access to sophisticated weaponry—though not, so far at least, nukes.

How long this will be true is an open question. Many people oppose the breeder reactor because they fear the plutonium it produces could be stolen by such terrorists. That isn't a bad thing to worry about,

but I don't think it's the right thing. Why steal raw plutonium? It would be just as easy to steal a full-fledged nuclear weapon. There are tens of thousands of them scattered around the world. Seven thousand are in Europe, mostly in American Army bases where thefts of all kinds have been an open scandal for years.

Nuclear weapons might be troublesome for small groups to handle, but nerve gas would be an attractive weapon. Since it is not deployed as a stock item in operational bases it is not easy to steal, but one of the most deadly of the gases, VX, is fairly easy to make. Once you know how. And for a time five or six years ago the know-how was available. As with most weapons, it was patented—how else would inventors get their proper rewards? Such patents are classified and hidden away; but a clerk in the British Patent Office made a little mistake, declassified the patent and put it in the open-access files. And so for a period around the beginning of 1975 anyone who cared to pay a few pence could buy a copy of the formula and details of the manufacturing process. It is not on record how many people did buy the patent, or what use they made of it.

The line between an Irish Republican Army man mailing a letter bomb and full-fledged insurrection is hard to draw precisely. But at some point it stops being a matter for the F.B.I. or the local police and becomes a military operation. For this the Defense Department has a long list of what are called "crowd control" devices, ranging from cattle-prods and water cannon to chemical agents—please, not chemical *warfare* agents!—that make you sneeze, cough, fall down or puke.

Small-scale operations, of course, tend to escalate. Then they attain the medium scale, which is the conventional sort of warfare that we've all experienced in World War II, Korea, and Vietnam.

This is the warfare of naval battles and daring aerial penetrations, of tank combat and foot-soldiers—the warfare that the people who run wars feel most secure with. For that reason, a great deal of the drawing-board weapons are designed for “conventional” war.

Some of them, to be sure, are extremely unpleasant: e.g., the “air-burst bomb,” in which a cloud of combustible fluid is allowed to expand into the air over an acre or so before it is touched off. Troops where that bomb goes off are not struck by it. They are inside it. But there are not, really, very many entirely new weapons. What there is is a huge catalogue of improved, or bigger, or more sophisticated versions of fighter aircraft, bomber, submarine, artillery and tank. The Navy would really like to have a fleet of 90 SSN nuclear attack submarines, which come at half a billion dollars a boat. It would also like to have more and bigger aircraft carriers of the *Nimitz* class, preferably nuclear so that they could remain on station indefinitely. This is a desire without a real price tag, because it is hard to calculate just what investment is involved. You can’t leave a big carrier out in the ocean by itself, because it is a nearly perfect target. So it requires support vessels and protective ones, and some of them—the proposed CG-47 AEGIS cruiser, for example—themselves cost close to a billion each.

And that brings us to the point where all predictions of the future begin to break down.

As Dennis Gabor says, “The future cannot be predicted. It can only be invented.” The shape of future war, like the shape of everything else in the future, depends not only on what is possible, but on what decisions are made. Rocket weapons and atom bombs were theoretical possibilities in the 1940s. What transformed them from the possible to the real was a set of political decisions—the decision by the

Nazis to fund Werner von Braun's researches at Peenemunde, and the decision by Franklin D. Roosevelt to fund the Manhattan Project. Without those political decisions, the weapons would have remained only possibilities.

Whether any of the newer weapons we have been discussing ever become hardware also depends on what decisions are made—by people who have the muscle to make the decisions stick.

How the decisions are arrived at is a little less clear. It does not always follow the textbooks. Basic theory in the "sad science" of economics tells us that one decision will always be imposed by the constraint of limited resources—a decision, for instance, to choose one weapon and not another, or to choose between a large number of cheap, rough-and-ready weapons and a small number of state-of-the-art technological triumphs. In the United States that constraint has not always operated. For many years American defense spending proceeded almost as though resources were unlimited. But that turned out to be one of the major contributing causes of inflation, and the decision makers in Congress and in the office of the budget are beginning to reenact those economic laws.

The Russians, who are the Other Guys we worry about most, have other constraints operating on them. It is unsafe to make flat statements about the technological limitations of the Soviet Union, as we all learned with astonishment when Sputnik went up. But all the same it looks quite certain that they simply do not have the capacity to match the American state of the art in such fields as guidance and avionics. They also, no doubt, have their own budget problems; in any case, their weaponry is generally more plentiful and less effective than ours. In 1976 Lt. Viktor Belenko of the Red Air Force flew his MIG-25 to Japan to claim political asylum (and a cash reward). Experts on our side wasted no time in taking it

apart for study. It was a surprise. It was grossly heavy, because it was made out of steel rather than light alloys, and unexpectedly primitive, with fatigue cracks repaired by rough welding. It was also slow to accelerate and, in general, markedly inferior to contemporary Western aircraft.

But there are a lot of them. And because they are relatively crude, they are also relatively easy to keep running. (Our own hot new F-15 breaks down so often that only about a third of them are operational at any one time.)

In the naval air area, the Soviets have gone for small carriers, mostly furnished with helicopters. We have the big ones, but we also have other options. Instead of the nuclear giants, we could build a larger number of small carriers with VTOL or STOL planes. They could do everything a Nimitz could do, a lot more cheaply . . . well, maybe not everything. There is one function that the biggest serves best. Every flag officer wants a suitable flagship. As there are no more battlewagons around, a *Nimitz*-class carrier is the grandest flagship there is.

Really, though, there is no wholly reliable way to compare the Soviet armed forces against the American. The headlines are full of stories suggesting they are out-arming us—but so were they twenty years ago, when the “Missile Gap” was on everyone’s tongue and did not, it turned out, really exist at all. Most comparisons are based on dollar costs, how much we spend against how much they spend. These are at best imprecise. At worst, they may be wholly meaningless.

The CIA, which is charged with preparing these estimates, makes its comparisons on the basis of “closest equivalent” weapons systems. But the equivalents may not be very close. If the CIA applied the same standard to the comparison with, say, a tribe of Australian aborigines they would have to equate their boomerangs with, perhaps, a Trident

missile; in which case the aborigines would clearly have overwhelming "equivalent" superiority over the United States. The only real way to measure Them against Us would be to throw all the armed forces of both sides into a ring and let them fight it out.

And that, of course, is the top-scale version of future war: the all-out nuclear exchange.

The trouble with nuclear (apart from the fact that it causes a great many people to be dead) is that it is over so fast it isn't any fun. In fact, it isn't really a "war." It is a stand-up shoot-out, exactly like the gunslingers in *High Noon*. You take your best shot. The Other Guy takes his. And that's the end of it.

The big difference is that when two cowboys shoot it out one or the other might miss. In an all-out nuclear exchange nobody gets missed. There is enough devastation for everybody. Right now the U.S. nuclear arsenal contains the equivalent of 615,000 Hiroshima-sized bombs. That's enough to annihilate every major Russian city 36 times over. The Russians are not quite so well supplied. They have only the capacity to annihilate every major American city 11 times. As of last count, the U.S.S.R. was adding one new nuke every 48 hours, the U.S. one every 8.

The strategic nuclear systems of both countries rest on a "triad" consisting of aircraft, land-based ICBMs and nuclear strategic submarines. At latest count, there were a hundred and twenty-one such subs in the world. England and France each have four. The United States has 41, while the other 72 belong to the Russians. Although the American fleet is smaller, it packs more punch. Each SSN has around 200 nuclear weapons. If a preemptive strike were to be so incredibly successful as to destroy every land-based missile and every aircraft—and destroy 39 out of the 41 submarines as well—the remaining two could destroy all

218 Soviet cities with populations of more than 100,000. Even *one* surviving sub could destroy every city over 150,000.

The airborne strike force is the weakest leg of the triad in both establishments. In the Soviet, it is almost negligible; in the American, it is fading fast. When the B-1 bomber project was canceled, amid extreme expressions of outrage, it spelled the end of any real hope of some future *Enola Gay* dropping a bomb on Moscow. (But the hope was probably an illusion. If B-1 had gone on the first planes would be coming into service somewhere around now—just in time to be confronted with new Soviet lockdown/shutdown radar and weapons systems that would make them instantly obsolete.) What the Air Force has is some sophisticated, heavyweight, MIR Ved, air-launched missiles. They don't have to fly over a city to bomb it any more. They can launch their missiles from airspace a nation or two away.

Our ground-based systems have just been retrofitted to toughen them up. The silos, once capable of surviving the transient air pressure from a missile attack of 300 p.s.i., are now proof against 2000 p.s.i., which makes them essentially invulnerable. For a decade or so, anyway. Beyond that, there's the famous MX project, which would put the missiles on big trucks designed to scurry from one shelter to another when conditions got hairy. MX would add a decade or two of safety (perhaps). The price tag would not only be thirty-three billion dollars or so, but would also take large chunks of Utah and Nevada's land.

Since any leg of the triad has all the muscle it needs to do the job even if the other two were totally blown away—and since any of them can still wipe out any conceivable enemy even if it itself has sustained 50% losses or more (95% losses in the case of the submarine force)—one might ask what we would get for the \$33 billion.

The usual answer is "bargaining chips."

The theory behind adding "bargaining chip" weapons systems is that it will scare the pants off the Other Guys and make them more tractable. A couple of decades ago, that was the rationale for the famous ABM system, the anti-ballistic-missile missiles that were supposed to be able to shoot down the Other Guy's missiles before they could do any damage. Most experts outside the Defense Department argued that it wouldn't work in the first place; and sure enough, it didn't. After a good many billion dollars had been spent it was quietly scrapped. Most experts outside the DoD also argued that even if it worked, its only effect would be to spur the Other Guys into building counter-weapons of their own, and that is indeed what appeared to happen. Bargaining chips seem to be prime movers in escalating the arms race.

In the same way, many experts, like Oppenheimer, argued against the attempt to develop a hydrogen fusion bomb in the early 1950s. We built it anyhow, largely at Edward Teller's authoritative urging. But five years ago, two decades after the fact, some scientists made a study to re-examine the evidence. They had, of course, the benefit of hindsight. In their conclusions, as published in *Scientific American*, they found that Oppenheimer et al had been right and Teller et al had been wrong. The Soviets did not initiate a hydrogen-bomb program. They responded to ours.

Of course, one can argue that neither Oppenheimer nor Teller could have been really sure of his opinions, and that the right thing to do was to build it anyway: better safe than sorry.

But there are not many people in the world today who feel really safe. What gives most of us unease is all those weapons pointed right down our throats.

It does not seem that it is possible to keep on with the escalation of the arms race without, sooner or

later, all those big bangs going off. It seems certain that there is only one way to stop it, and that is to stop it. Nothing else has worked.

It also seems highly probable, at any rate, that as long as the principal decision-makers on armaments are the generals and admirals who would like to have them handy there will be no good chance of stopping. Clemenceau told us that war was too important to be left to generals. At least one high American officer has stood the saying on its head. Peace is too important to be left to civilians, said Admiral Hayward last year; and the reason his sentiments are interesting is that he was at one time the man in charge of a considerable part of our nuclear strike force.

Wars seldom happen the way they are planned. At least half the participants must find that their plans have gone wrong, since they lose; at least some of the other half win only because of factors that have nothing to do with plans. Wars are contests between bad guessers. Thucydides said more than two thousand years ago, "Many schemes which were ill-advised have succeeded through the still greater folly which possessed the enemy, and yet more, which seemed to be wisely contrived, have ended in foul disaster." And, in an all-out nuclear exchange, "foul disaster" is all either side can expect.

It is not really accurate, in fact, to say that such things as plans for nuclear war even exist. There is a lot of planning. But what it consists of is attempts to back the Other Guy down—which is to say, of attempts to keep the war from happening in the first place.

And that, of course, is what scared my middle-western college-professor friend. What if in some future confrontation nobody backs down?

It scares me, too.

—Frederik Pohl

#1
THE

ADVENTURE NOVEL OF THE YEAR!

JANISSARIES

by JERRY POURNELLE

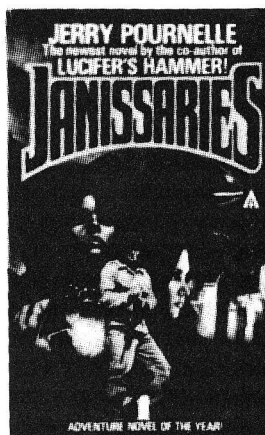
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The spectacular feats of
American mercenaries
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*"Pournelle... has written a fine
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\$2.50



ACE SCIENCE FICTION

PEACE FROM ON HIGH

BY JOE HALDEMAN



WHEN MILITANT ENTHUSIASM FIXATES
ON POLITICAL IDEALS THE RESULTS
CAN BE PARTICULARLY UGLY, WITH
THE-END-JUSTIFIES-THE-MEANS
VINDICATING ASSASSINATION, SABOTAGE,
RANDOM TERRORISM.

We go to war ostensibly as a last resort in political and economic problems, or out of religious or racial passions—or sometimes for patently indefensible reasons: to provide excitement for a class of people, or to try out new military techniques, or even, at least once, over anger at the outcome of a ball game. People can argue endlessly over the justifiability of going to war for this or that reason; we want to examine our motivations more deeply.

Is there something in human nature that makes warfare “natural”? If we understood the part of our human-ness that makes us go to war, would it be possible to sidetrack it?

Konrad Lorenz, in his convincing book *On Aggression*, developed a logical argument explaining the evolution of organized warfare. Briefly summarized, it goes as follows:

Lethally-equipped carnivores, in particular, have strong inhibitions against “seriously” attacking one another. At most, they engage in ritualized combat behavior that determines which individual is stronger, conducted in such a way that the weaker individual is not seriously harmed (generally, the winner goes on to mate; the loser either sulks or seeks out another combat).

Human beings, lacking great strength or sharp teeth and claws, evolved without these inhibitions. But when we became tool-users, we were suddenly the most deadly species on the planet.

At the same time, though, we were social animals. Lorenz attributes the generalization of murder into war to processes he calls “pseudo-speciation” and “militant enthusiasm.”

Pseudo-speciation describes the way we divide ourselves into various discrete groups by copying the behavior of those around us. Eventually, the groups may become quite incompatible. The divergence of languages is an obvious example, but less fundamental activities such as posture and habits of grooming,

diet, and so on, also separate us from neighboring groups—and very often the degree of difference has little to do with the degree of estrangement.

Militant enthusiasm is a state of mind, of being, that dominates many individuals for several years during and after adolescence: the need to identify strongly with a cause, with a tightly-knit group fighting for a common purpose. Unfortunately, the cause espoused may be trivial or even pathological—for every dedicated young Peace Corps volunteer there are equally dedicated surfers and Hell's Angels. When militant enthusiasm fixates on political ideals, the results may be particularly ugly, with the end-justifies-the-means vindicating assassination, sabotage, random terrorism.

In a more everyday sense, though, it is a combination of militant enthusiasm and pseudo-speciation that provides the world's armies with their fodder. This observation applies to conscription as well as recruitment. Most conscripts become willing enough soldiers, their traditional grumbling to the contrary, in spite of the obvious fact that they have no more personal freedom or identity than an imprisoned criminal, and less chance of surviving the experience.

I can speak with some authority about this. I was drafted in 1967 and wound up fighting in the Central Highlands of Vietnam, in a combat unit where at least nine out of ten soldiers were also draftees. No one under the rank of captain had any political sympathy for the war; none was planning to spend one more second in the Army than the law required. Yet we were a fairly efficient outfit, as reflected in the cold language of kill ratios and in the bright bits of ribbon armies like to pass around. Why?

The role of militant enthusiasm is fairly obvious, since most of the boys were not yet twenty. Pseudo-speciation enters at two levels, neither of which, I think, was the result of conscious effort on the part of the military.

As old as war itself must be the process of teaching new soldiers that the enemy is not really human. He is given a dehumanizing name—gook, kink, jap, kraut—and becomes the second most popular topic of conversation. Soldiers constantly trade stories about his ferocity, his alien behavior, the (inhuman) atrocities he commits, all with the goal of reinforcing an unspoken argument: It's a sin to kill a human; the gook is not a human; therefore it's not a sin to kill a gook. Logicians and vegetarians will see the illogic of this scrambled syllogism, but most soldiers embrace it subconsciously, never examining it. (The enemy were similarly taught. When we took prisoners they were usually terror-stricken in expectation of the treatment we were going to give them; many committed suicide rather than be captured.)

Another level of pseudo-speciation, which merges with militant enthusiasm, was the understanding that the main reason for fighting was to protect your comrades—your squad, platoon, company in roughly descending order. I'm sure this is a strong motive for any soldier, but it was of prime importance in motivating a fighting force that was not driven by patriotism; that knew little and cared less about the political justification for the war.

This digression isn't meant to demonstrate that Lorenz's two mechanisms are evil, no more than the sexual impulse is "wrong" because it often leads to unhappiness. In fact, Lorenz argues that pseudo-speciation is the root source of all lawful and even moral behavior, since we all initially conform to what we've been taught is right, and later adjust according to our individual perceptions of rightness. And it can't be denied that militant enthusiasm often fuels worthwhile goals.

How can we adapt our understanding of these two forces to model a future without war? I think a useful jumping-off place is to look at science fiction, where

both have been treated implicitly, often enough to generate clichés.

Especially beloved of B-movie and television writers is the future where pseudo-speciation has been effectively side-stepped, by postulating an Earth (or other planet) where only one single culture exists. It's not difficult to imagine a progressive sophistication of techniques in the social sciences and education, such as is assumed in Orwell's 1984, that might eventually make it possible for such a future to be imposed on an unwitting, perhaps unwilling, population. It's even possible that in the natural course of things, one way of life will prove so demonstrably superior that all cultures will eventually embrace it.

But these "One World" utopias don't really solve the problem. They might well be without war, if the required conditioning were efficient enough to guarantee absolute cultural solidarity, but they would also result in a humanity less than human: static, stagnant. It's true that world peace would require some sort of world-wide peace-keeping authority. But there is no reason to presuppose that it would be necessary for us to sacrifice our individual and group diversity to it.

Another science-fictional approach to this is the notion of actual speciation—that is, of changing *Homo sapiens* into some "*Homo superior*," who of course would be above war. A few years ago it would have been reasonable to dismiss this as simple fantasy. Today, it's not too far-fetched to extrapolate from recombinant DNA research to eventual genetic engineering of higher animals and, finally, humans. But even if the idea didn't have truly Frankensteinian implications, we'd still have to reject it as a useful line of investigation. There are too many procedural questions that can't yet be answered: Can techniques that have worked to alter the metabolism of simple organisms be applied to subtle changes in the far

more complex genetic structure of human personality? Could a socially undesirable trait be eliminated without affecting desirable traits? (Love and friendship, Lorenz claims, are derived from instinctive behavior patterns related to aggression.)

Science fiction's approach to militant enthusiasm is more interesting. It usually postulates a more-or-less dramatic application of what Lorenz calls "redirected activity"—pounding your fist on the table instead of on someone's chin, for instance. In science fiction the redirection is usually accomplished through some surrogate institution that takes the place of war.

Several authors have used a future where warfare is not completely eliminated, but instead is ritualized into a relatively harmless activity. Mack Reynolds, for instance, had multinational corporations settling their differences with teams of mercenary soldiers who slugged it out with primitive weapons on special reservations—for the entertainment of a population that was otherwise quite placid. Variations on this theme do have some anthropological justification, namely, the mock combat of certain primitive tribes. But even if they did describe a desirable future, it's difficult to see how we would get there from here; and limited or stylized warfare is still war.

A more generally acceptable surrogate, one that for a time became an unspoken axiom behind most science fiction stories, was that of space exploration itself. Writers used a sort of revisionist Turner Thesis logic: that the passions driving mankind to war might instead be applied to exploring and exploiting the endless frontier of space.

This assertion would be hopelessly Pollyannish if the only support for it were analogy to American history. Expansion into the West was supported by a brutal, shameful war. And the period of America's greatest involvement with space exploration quite

closely paralleled the duration of the Vietnam war. Analogy's a tricky and limited tool, though, and I think a good case can be made for this idea by applying Lorenz's insights on aggression to current thinking about space industrialization in the near future.

Most of this magazine's readers must be familiar with the O'Neill Plan; I will present only a broad outline of it:

Princeton physicist Gerard O'Neill begins with the premise that there can be no stable world order until all the world's people are reasonably prosperous—at least provided with adequate food and shelter—and that the key to this prosperity is an abundance of energy. If this energy were to come from conventional sources, though, there would be dire environmental and political consequences.

O'Neill proposes that the energy come from space. Solar power satellites (SPS's) would generate electricity in orbit and transmit it to Earth via microwaves or infrared laser. The SPS is far superior to a ground-based solar energy plant because it runs 24 hours a day, isn't bothered by weather or the attenuation of sunlight by the atmosphere, and doesn't take up large areas of potentially useful land.

The largest problem with this is money, and by far the most expensive part of it is getting into orbit the materials for building the SPS's. Just one of them would weigh about 50,000 tons—more than a thousand shuttle flights, at \$30 million a trip, which means an Apollo-sized price tag just to get the material into low Earth orbit. And the plan calls for dozens of generators, in high orbit.

What O'Neill suggests is that we don't have to orbit raw materials. Instead, we put into orbit processing plants capable of using raw materials that are already up there, mining the Moon or an asteroid. This could provide a tenfold saving in the cost of the first SPS, with even more dramatic savings for sub-

sequent ones, since the factories would already be set up.

At the heart of O'Neill's plan is that the exploitation of space could soon take off on its own, becoming independent of Earth. The labor force that built the first SPS's, some thousands of people, would live inside a large structure that held an Earthlike environment. While they built power satellites, they would also be building more factories and habitats. By the time there were enough SPS's to satisfy the Earth's power needs there could be a stable and growing community of these orbital settlements—another country, in a sense, but in important ways quite different from any community that has ever existed on Earth.

Suppose O'Neill's first premise is wrong, and abundant energy from space does not lead to general prosperity or (as we must admit is possible) there is prosperity but it does not lead to peace. Then this space community, originally a side effect of the SPS project, takes on new significance.

The apocalyptic scenario of thermonuclear or biochemical war destroying all human life on Earth is simplistic, but there is a remote chance that it could happen. An all-out high technology world war also could precipitate runaway ecological changes that could make the Earth uninhabitable. In this case the value of the space community would be obvious, a sort of lifeboat for our species.

But we don't have to invoke Armageddon to demonstrate the usefulness of O'Neill's ideas. There's a less dramatic, more interesting argument to be made.

The central political fact of the late twentieth century is the cruel arithmetic of an exponentially increasing population dependent on finite resources, unevenly distributed. Ten thousand people die every

day of starvation or nutrition-related disease, but thirty times that number are born each day. The cultures that suffer the most from starvation also tend to have the highest birth rates, which is negative pseudo-speciation with a vengeance. The United Nations predicts that it will take about a century for deaths to equal births, with population stabilizing at around twelve billion.

The most humane model of life on Earth consistent with this future requires that we somehow triple our production of food, and distribute it fairly enough that all twelve billion can subsist—and then somehow reduce the birth rate so that the population can remain stable without benefit of famine. Unfortunately, it seems more likely that we will conform to the pattern observed in overcrowded animal populations: a relatively sudden reduction in number, to a population that can be served by the available resources. In our case, the reduction would probably involve warfare.

No responsible person would deny the link between the population explosion and the danger of war. O'Neill doesn't suggest that "space humanization" would make a dent in the population directly, but he does observe that a culture's birth rate will invariably go down as its prosperity increases. This prosperity is normally gained at the expense of another culture, through commerce or war, but that wouldn't be so if it were the result of energy from space.

This, then, is a short-term benefit of space humanization—a potential avenue for economic growth from resources that come from outside of the existing global economic system; wealth that a country can use without depriving another country of wealth. But there may be a long-term benefit on a vastly larger scale.

There are two probable patterns for the future population of the Earth: either a crowded steady-

state situation, where population control has succeeded, or an oscillating pattern, where a period of increase is followed by catastrophic decline through war, famine, or disease; then subsequent alternations of increase and decline. Right now, the second pattern seems the more likely.

Real estate brokers justify land as an investment with the observation "They aren't making any more of it"; this homily is trivially the final argument for population control and the reason behind most war. But the space settlements described by O'Neill do make new land; furthermore, the amount of land can increase geometrically, since each new settlement is in the business of making other new settlements.

It may seem absurd to consider the interior of an orbiting vessel to be "land," since if we think of space habitats at all, it's in terms of cramped laboratory environments like Skylab and Soyuz. But O'Neill's settlements aren't made of mass that has to be lifted from Earth—the vehicle that put Skylab up weighed nearly 40 times as much as the habitat—and the energy for moving the mass can come from free sunlight. So these habitats can be quite large and relatively roomy. O'Neill suggests as a basic structure a sphere nearly a mile in circumference (diameter 460 meters), which could house 10,000 workers in a space no more crowded than a small town. The living conditions inside would be comfortable, parkland alternating with housing, offices, and shops. The satellite would rotate to provide normal gravity, and would have a retinue of agricultural modules to supply fresh food.

Half of the workers would be employed building SPS's; the other half building new habitats. O'Neill estimates that it would take seven years for such a work force to build a habitat . . . and from that point the space community could grow with the speed of a yeast culture: in 14 years there would be four

habitats; in 21 years, eight. In less than fifty years there could be a hundred habitats, room for a million people. In fact, the growth rate might be even faster, since at some point the market for SPS energy would be saturated, freeing the entire work force for habitat construction. (Actually, the habitats wouldn't be rubber-stamp duplicates of the first one. Designs would improve with experience, and it seems likely that very large ones would be built eventually. O'Neill describes an "Island Three" that is large enough to accommodate the entire population of New York City.

Where does all of this lead? If these settlements are to be nothing more than dozens or hundreds of new little countries, separated by vacuum rather than lines on a map, then we've done nothing but export our problems, expanding the scope of warfare in interesting ways. I think it will be profoundly otherwise.

The people who live inside these worlds will not leave militant enthusiasm and pseudo-speciation behind them. They will get fired up over "causes" and they will perceive humanity in terms of us-and-them. But *them* will be the people still living on Earth, safe beneath their blanket of air, rather than fellow space-dwellers. And this alienation, no matter how deeply it might eventually be felt, would not manifest itself as war between the space settlements and Earth—it would be a very short war, since a massive satellite is an unmaneuverable sitting duck.

The militant enthusiasm of space dwellers would have to find other outlets. As science fiction writers have predicted, space exploration would be one of them. Space travel would be a much simpler proposition than it is to us, who have to struggle out of Earth's gravity well. After a couple of generations' progress, individuals or businesses or families might even cobble together their own spaceships: thumb

their nose at the old fogies and set sail for the Asteroid Belt.

But there are more ways of "getting away" than simply leaving, and this may ultimately be the most important effect of space humanization. Space settlements will reject many of the details and some of the axioms of the political systems they leave behind on Earth. They will experiment with new patterns of social organization, and some of their experiments will bear fruit.

In the mid-18th Century, the population of the British colonies in America numbered barely two million people. Out of that small group came such men as Washington, Jefferson, Franklin, Henry, Adams—and a political system that fired the world's imagination and permanently changed the human condition. It's fair to ask why, with a hundred times the raw material, with two hundred years of experience and reflection, we can't generate a few people of that caliber now.

At first blush this may look like nothing more than a peculiarly American slant on the old historical puzzle of whether "the times make the man" or vice versa. But it's a more general problem—the rest of the world isn't enjoying any surplus of innovative statesmen—and it provides some insight into the possible social utility of space humanization.

The American constitution was written under circumstances very different from previous or subsequent documents. Unlike the bloody aftermath of the revolutions in France, Russia, and China, there was no suddenly tumbled ruling class; no profound redistribution of wealth. There was simply the need to build a workable political structure (the juryrigged Articles of Confederation having been hamstrung from the beginning) coordinating the sometimes conflicting desires of the various colonies. Most significantly, this structure could be worked out *in vacuo*—

pun intended—without interference from foreign powers, from basic principles embodied in English Common Law and classical Greek notions of democracy.

There is no place on Earth where a similar environment can exist today. Modern revolutions in Latin America, Africa, Asia, and the Middle East have not resulted in fundamentally new models of social organization. I can't believe that this is because the people involved are all blind to the need for new models, or that they are manifestly inferior in social conscience or intellect to the upper-class Anglo-Saxons who drafted the American document. It's just that there is no political laboratory on this planet that is free of contaminants. No new government can function effectively without aligning itself to a superpower. And the superpowers themselves are sodden with inertia, topheavy with millions of bureaucrats whose daily survival depends on the maintenance of yesterday's forms and values.

No one can guarantee that the space settlements will provide a political *tabula rasa*. In fact, the first settlements will doubtless be heavily in debt to the organizations that provide the wherewithall to get them off the ground—just as the colonies in America started off with debts to British, French, and Dutch concerns—and it isn't likely that this indebtedness will be free of political strings. As the number of settlements increases, though, they will be less and less dependent upon Earthbound economies; growing away much as the United States grew away from European tradition as its frontier moved west.

But the settlements' frontiers can expand almost without limit, and the expansion will be done in peace. For they will have to accept as an initial condition of life a slogan that to us is, so far, only an approximation of truth: war is suicide.

—Joe Haldeman

FOREWORD

Editor Baen pointed out that I could've added an important datum. "What if I don't have four rolls of toilet paper," he asked.

"Stay out of Mexico," I said.

"I'll put it another way," he sighed: "What if I'm willing to spend a few bucks for good commercial filters?"

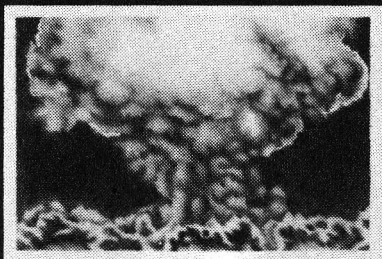
Good point. Well, Cottrell precipitator-type electric filters will cost too much, and they won't work when the power goes off. Get a high efficiency fiber element—HEPA Corp., Flanders, Inc., and Farr sell replacement cartridges for \$20 and up through air filter vendors—of the sort used by nuclear labs, industrial clean rooms, and operating rooms. These luggage-sized cartridges must be set into a frame that you can buy or build, with your conduit leading from the frame into your shelter.

These commercial filter elements don't resist passage of air much, so you can pump faster, easier; or you can use a small fan. Specify a rigid cartridge that removes 99.7% or more of particulates down through the two-micron range—which means it'll remove most spores and bacteria, too—and is rated at hundreds of cubic feet of air per minutes. A Farr 'Riga-Flo 200' cartridge is a good example. If you install a cheap coarse furnace filter element in front of such a cartridge, it should keep you breathin' easy for a month without replacement, in all but the most horrendously lethal fallout area.

NUCLEAR SURVIVAL

PART TWO:

**LIVING UNDER
PRESSURE**
BY DEAN ING



LIKE EVERYBODY ELSE,
YOU FAILED TO BUY
THE EQUIPMENT AND
MUST EITHER MAKE
YOUR OWN AT
THE LAST MINUTE
OR DIE TRYING.

In the previous issue of *Destinies*, we began this series of articles to update and alert you on the problems of survival after an all-out nuclear exchange. Briefly summarized: in "Gimme Shelter" we explained that twenty-mile-wide, thermonuclear-kindled firestorms would render many U.S. urban areas utterly uninhabitable. The government—much too quietly, in my opinion—now favors mass evacuation from high-risk areas following an alert. The

problems with this new and more sensible civil defense (CD) posture lie in educating us about it; in the likelihood of clogged routes during the evacuation; in improvising shelters in low-risk areas; and in doing anything on a large scale with damnably low CD budgets. We also referenced some publications and promised to give you some tips on making a shelter more effective, starting with air filtration and pump units that you can make on short notice. We're making good on that promise now. In a phrase, one key to clean air is living under pressure.

We assume that you have your free copy of the government's CD pamphlet of February, 1977, *Protection In The Nuclear Age*, which admits the wisdom of 'crisis relocation' and suggests that you find a shelter completely surrounded by two or three feet of masonry or dirt. But even if you have such shelter, you still aren't safe from fallout unless you can make the place airtight.

If you've ever fretted through a dust storm, you know how air supports dust particles, and how a breeze sifts the finest ones past infinitesimal cracks around doors and windowframes. While a lot of fallout will be large visible ash, too much of the stuff will be invisibly small hunks of airborne grit, settling hundreds of miles downwind of a nuclear strike. They are lethal dustmotes if you breathe enough of them during the first two or three weeks after a nuclear strike. That's why a shelter should be stocked with caulking material and tape; so that every crevice in the shelter can be sealed. In short, you must turn the shelter into a pressure vessel and bottle yourself up in it.

Which means that you could swelter in your body heat and asphyxiate in your own carbon dioxide waste if you stayed inside very long without a fresh air supply. We'll give figures later in this article; for the moment, the rationale's the thing.

If your supplies are adequate, you might stay in the shelter for weeks—but almost nobody will have a week's supply of bottled air. What you need is a means for pumping cool filtered air from the outside, and for exhausting the stale humid air from your shelter. Believe it or not, the solution isn't necessarily very complex once you've practiced doing it, even on a small scale model.

We infer from sources on Soviet CD that the first stage of their civilian shelter filters is through something called a 'blast attenuator'—a wide vertical conduit pipe filled with big rocks and gravel. The pipe has a raincap on top, aboveground, and a removable grille covering one side of its bottom end. The grille is sturdy enough to hold the gravel and coarse enough to let air through. Notice that a conduit of twenty-four-inch diameter can be used as an emergency exit, once the grille is removed and the gravel drained out. The gravel lets air through while trapping large fallout particles and baffling concussion waves from any nearby explosions. The Soviets use finer filters for the air that is sucked down through the gravel by pumps. Incidentally, if you're building such a 'blast attenuator' for a shelter, specify rounded quartz gravel. Hunks of limestone can eventually become cemented together to become a rigid sponge that impedes airflow.

In extremis, you could build a medium-mesh filter by taping a towel over a square-foot-sized inlet into the shelter. You might find it clogged after a day or so. A finer-mesh filter can be made with corrugated cardboard, large juice cans, replaceable rolls of toilet paper, and tape.

Our demonstration rig was designed to provide air for two adults. It uses a standard household furnace filter element taped securely over the intake hole of the filter box—because we assume that you *won't* have a yards-long gravel-filled conduit. After you

build your air filtration unit, you'll have to place it in some weatherproof spot just outside the sealed shelter. Thus, you can get to the unit quickly in case filter elements become clogged.

The standard furnace filter has a coarse fiberglass element. Particles that get past it will be small, but many would be visible to the naked eye. That calls for a second and finer element.

For its second element, our model uses the same stuff employed by a great many industrial air filters: nothing more than a piece of flannel. As it happens, we spent a dollar on a yard of cotton outing flannel, enough for a one-square-foot filter element with eight spares. That might be enough for two weeks, depending on how much fallout is in your area. We could've used a new diaper or a flannel shirt; it's the soft fuzzy nap of the flannel that traps so much dust. Flannel that's been washed until its fuzz has gone the way of all lint is, ah, washed up. Don't use it, or use two layers. Terrycloth could be used, but to less effect.

So far our scheme calls for a coarse fiberglass filter element taped over a shallow frame of some sort and, right behind it, one fuzzy flannel element. In a pinch, these elements would probably protect you from 95% of the fallout without finer filtration. But the particles that get past these two coarse elements might still zap you if fallout is heavy. What we really need is a still finer element, or a set of them in parallel, to take out particles of micron size. That's where toilet paper rolls come in.

For many years, some engine oil filters employed a roll of toilet paper as the filter element. The oil was forced under pressure to pass between the many circular layers of paper—and the central hole was, of course, plugged. Note well: the oil didn't pass from one *side* of the paper cylinder to the other; it passed from one circular *face* to the other. In the process, even very small solid particles in the oil were trapped



in the paper. Only the smallest particles, reportedly on the order of a half-micron, could get through such a filter element.

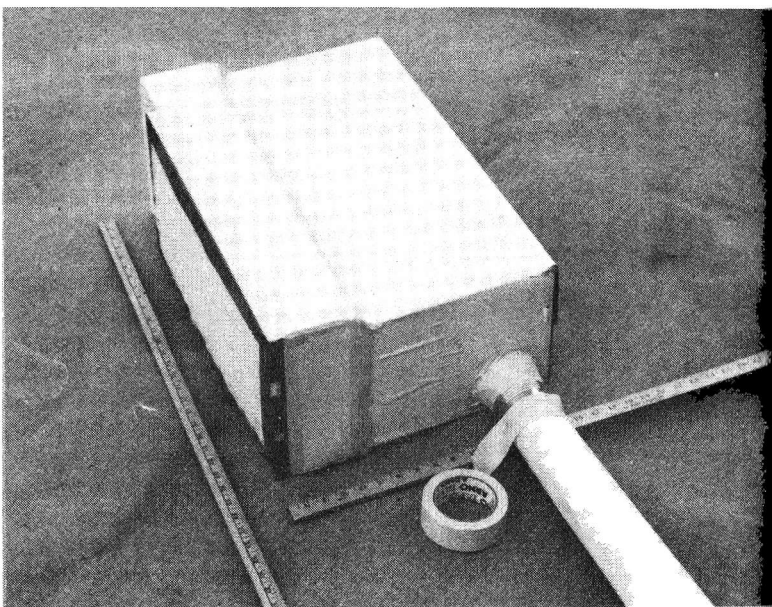
The same kind of filtration works in extracting tiny fallout particles from air. However, we assume that your air pump (like ours) will be the sort that provides high volume but not much pressure. Since a paper roll restricts the airflow somewhat, it's necessary to use at least four of the rolls simultaneously, in parallel, to allow enough airflow for two adults. It's worth repeating: a four-roll filter is minimal. Use more if you have the materials.

In Figure 1 we see the filtration unit during assembly. The coarse filter elements with their shallow cardboard frame are ready for mounting, the fiberglass element hinged by masking tape and ready to swing down over the flannel element. The shallow frame will fit over the canisters holding the (fine) paper elements. Our small model uses only four

paper roll elements, fitted into juice cans. The can with Fine Element #1 is already taped in place; Fine Element #2 is in place, ready for taping; Fine Element #3 is ready to be thrust into its hole; and the hole for Fine Element #4 hasn't yet been cut. Element #4 lies beside the filter box with the paper roll inside its canister. To prepare the hole for Element #4, first cut out the central hole; then cut the radiating slits; and finally fold the slit tabs of cardboard outward so that the hole allows passage of the juice can, in the same manner as Element #3. The white paint on the unit isn't just cosmetic; a gallon of quick-drying latex paint will seal the pores of lots of corrugated cardboard.

You'll probably find that a roll of toilet paper won't fit in a juice can until some paper has been unrolled. Strip off the necessary layers and stuff some of it into the can before you insert the roll. Stuff the rest of the paper tightly into the central hole of the tissue roll. Lastly, insert the roll into the can so that it's a snug, but not crush, fit. Of course there must be holes in the other end of the canister through which air can be drawn. In the demo model we've punched four triangular holes next to the closed end of each can, orienting the holes so that when the filter box lies in its normal position, air must rise up through the holes. This gives fallout particles one more chance to drop out. In Figure 1, the filter box stands upended so that you can see assembly details.

In Figure 2, the filter box lies in its normal operating position. The coarse elements and their cardboard frame have been taped in place on the filter box. Hidden within the coarse filter frame are the four canisters with the fine-filter rolls, taped securely in place. Every seam on the unit has been double-taped, and you can see its size from the meter-sticks in the illustration. The small soup can inserted at one rear corner of the filter box has both



its ends removed. It merely provides a connection to the air conduit tube leading from your filter unit to the pump in your shelter.

Our pump unit is a simple bellows pump, made from another cardboard box. Obviously, if you have a hand-cranked blower, a battery-powered automobile heater blower, or some other commercial pump, you're way ahead. We're taking the position that, like almost everybody else, you failed to buy such equipment and must either make your own at the last minute or die trying.

Before starting on the pump body, make its conduit tube. If you don't have the equivalent of a three-inch-diameter cardboard tube, grab a thick section of old newspaper and roll it into a tube. Tape the long seam and tape the ends to prevent fraying, then slather latex paint over it. Make it no longer than necessary, remembering that the longer it is, the

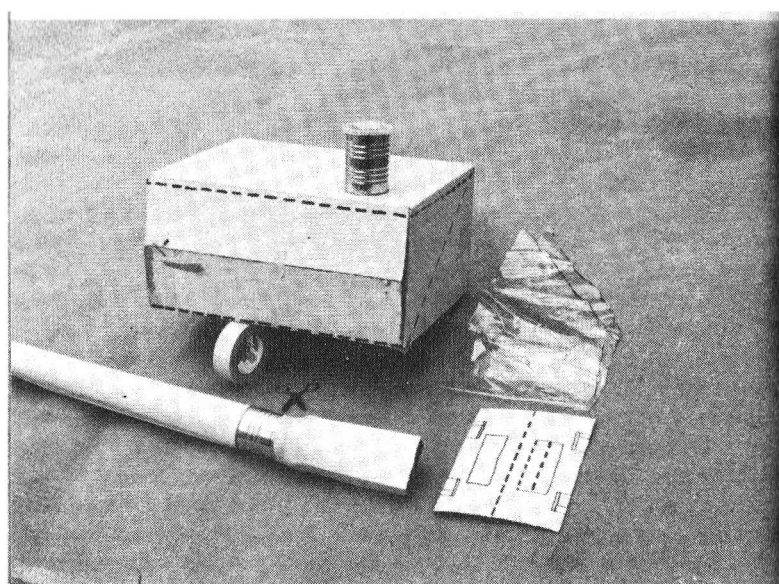
more resistance it has to airflow. Ideally your filtration unit will be only a step from your shelter, so you'll need only a few sections of newspaper conduit. Our demo model uses one section, just to show how simple it is.

Chances are, a newspaper conduit won't be sturdy enough on its own to withstand the partial vacuum created when the pump is working. So why didn't we use a heavy cardboard tube or, more efficient, smooth-walled metal stovepipe? Only because we assumed you won't *have* any. As it happens, there's a quick remedy for the 'collapsing conduit' problem. You make a long cruciform stiffener of cardboard, or several short ones, and insert it into the conduit. The conduit might still buckle a bit, but it won't collapse. If you can make conduit that's stiffer, without incurring a heavy time penalty, do it.

Now cut a round hold in your shelter wall near the floor and run the conduit through, taping around the hole, and tape the conduit to the filter unit outside (as we did in Figure 2). At this point you can retreat into your shelter and seal yourself in with tape. You're only half-finished, but you can breathe shelter air while you build the pump.

The pump unit is absurdly simple, really, even with its two flapper valves. In Figure 3 it's half-finished, the inked lines showing where you must fold and cut, including the flat piece that eventually becomes our admittedly gimmicky pump handle. For our bellows material, we used transparent flexible sheeting so that we could see through it to watch the inlet valve operate; but plain translucent, or even black, polyethylene sheeting would do. You should choose four-mil-thick or thicker sheeting.

You can see that the pump begins as a rugged corrugated cardboard box, with seams taped to make it airtight. As the dotted lines show, one rectangular



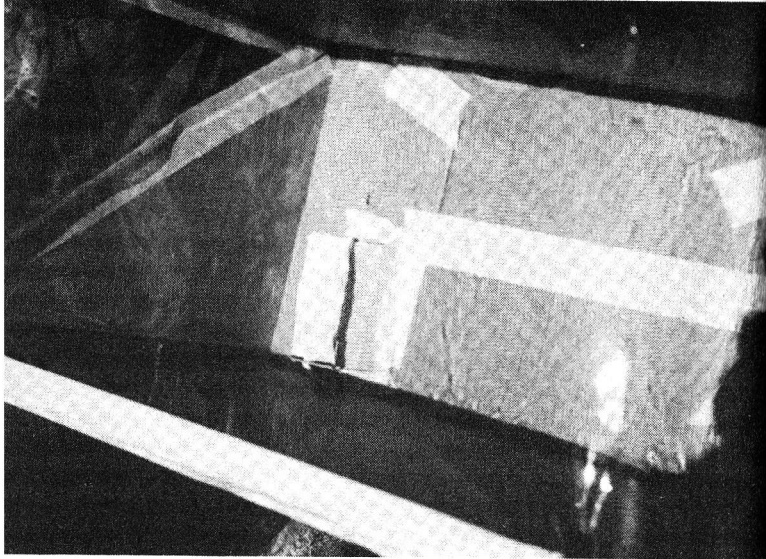
face and the adjoining triangular halves of two other faces must first be cut away. The removed cardboard can be used as a pattern to cut the flexible plastic bellows material. Or you can cut the flexible plastic free-hand, as we did. In Figure 3 the flexible stuff is folded double, lying between the box and the pattern for the pump handle.

Next make the pump handle. We like to play with cardboard, so we built a rigid cardboard handle that locked into the top of the pump with tabs, and we taped it around the tab slits to prevent air leakage. It probably would've been quicker to merely punch two holes in the box and to run a rope handle through the holes. Knots in the ends of the rope handle would keep it from pulling through, and tape around the holes would minimize air leaks. The point is, you can do it any of several ways—so long as you don't leave sizeable holes in the pump box which would dramatically lower the pump's efficiency.

Now for the moving parts: the two flapper valves. Here again, we deliberately made them of different materials only to demonstrate that you can use whatever's handy. In Figure 3, the valves aren't yet in place. The outlet valve is sitting atop the pump. The body of the inlet valve has been mated to a conduit tube via a soup can. We made the inlet valve from an empty macaroni carton; a sloppily-cut rectangle of cardboard slightly larger than the mouth of the carton; and a piece of masking tape as a hinge. Simply tape the cardboard rectangle—the flapper—at the top only, so that it hangs down over the mouth of the carton. Blow through the carton and the cardboard flapper swings out to let the air pass. Blow against the face of the flapper and it swings shut, preventing airflow. That's it; a one-way flapper valve. It isn't completely airtight, of course, but so long as it fits neatly over the mouth of the carton it's close enough. And it only takes a moment to make.

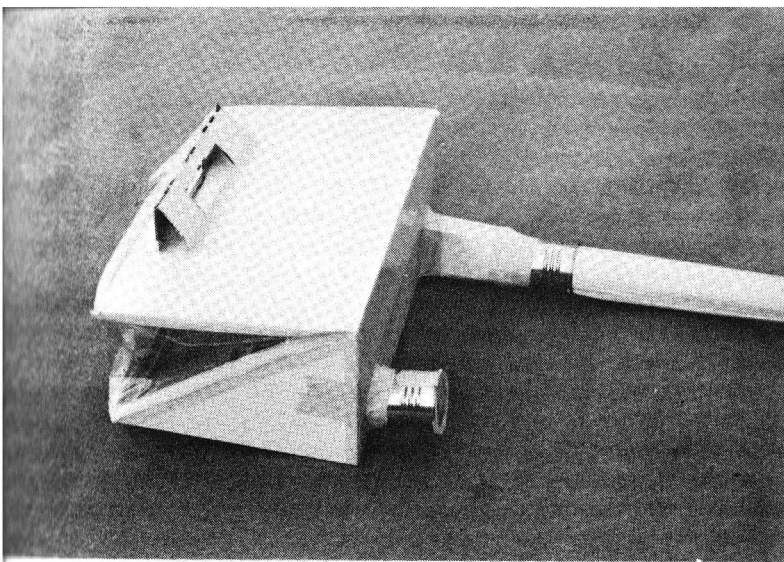
Cut a hole through the rear face of the pump box to accept the carton; shove the carton halfway through; and tape it in place. The valve works better if you mount the carton at a slight angle, protruding upward into the box. That way, gravity makes the flapper lie flat over the carton's mouth. In Figure 4 you can see the inlet valve flapper through the transparent bellows—about which, more later.

Make the outlet valve and install it the same way, except that the outlet valve flapper is mounted on the outside of the box. *Inlet flapper inside; outlet flapper outside.* In our model, we made the outlet valve from a soup can and a throwaway plastic lid. Even at the risk of boring you, I repeat: there was no special reason why the inlet and outlet valves were different shapes and made from different materials, except to prove that there are lots of ways to do it. For you perfectionists: with rubber faces between flapper and valve body, and with very slight spring-loading to



help them close, you could make better valves than we made. But it would take longer. Our model worked so well that the observer's typical first response was delighted laughter. The little bugger'll blow your hat off!

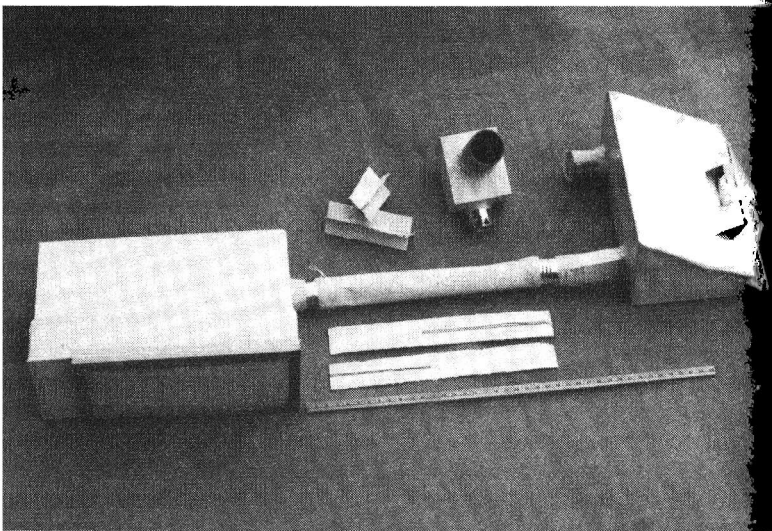
You're almost finished when you cut a long trapezoidal piece of flexible plastic sheeting (the same size and shape as the peice of cardboard you cut away along the dotted lines) and then tape the sheeting onto the box in place of the missing cardboard. When you finish double-taping and latex-painting the pump box (you don't have to paint the handle), grab the handle and raise the lid of the box. You should hear the pump draw a mighty breath, then a faint 'clack' as the cardboard flapper of the inlet valve drops back into place inside the pump box. Now push down firmly on the handle. The pump should exhale with a whispery 'whoosh', followed by another 'clack' as the outlet flapper drops back into place. Check for air leaks; if air is expelled from anyplace besides the



outlet valve, those leads must be sealed. In Figure 5, the completed pump is in 'inhale' position and the tape-hinged outlet flapper is visible.

Our small model displaces about two-thirds of a cubic foot of air with every inhale/exhale cycle. If you can start with a bigger box, naturally your pump will move more air—which is all to the good, as we'll explain later.

The last step before drawing clean air is simply to mate the conduit from the filter unit to the pump inlet; tape the joint; and start pumping. It may not keep absolutely all radioactive particles out of your shelter, but the little rig assembled for testing in Figure 6 should make your breathing air cleaner than outside air by several orders of magnitude—a thousand times as clean. For somebody who started three hours ago, you're doing pretty well! If two of you are building the units together it could be closer to two hours. Incidentally, in Figure 6 you can see cruciform conduit stiffeners of various lengths—the



longest one not yet assembled—and a stale air valve we haven't yet discussed because, when minutes count, it should be built last.

Though you now have a means to pump clean air into the shelter, you still need to consider how you'll get rid of the stale air you've already breathed. That stale air will normally be a bit warmer than it was when it entered the shelter but it'll be more moist, too, from water vapor given off by every animal in the shelter. The stale air will also be loaded with your exhaled carbon dioxide, which is slightly heavier than air. All in all, you can expect the moist, carbon dioxide-laden stale air to lie near the floor. Therefore, the stale air exhaust valve inlet should be placed at floor level, and far away from the fresh air squirting into your shelter from the pump.

Before you ask how much more mickey-mouse gadgeteering we need for the system, a glance at Figure 7 will show you. The job of the stale air



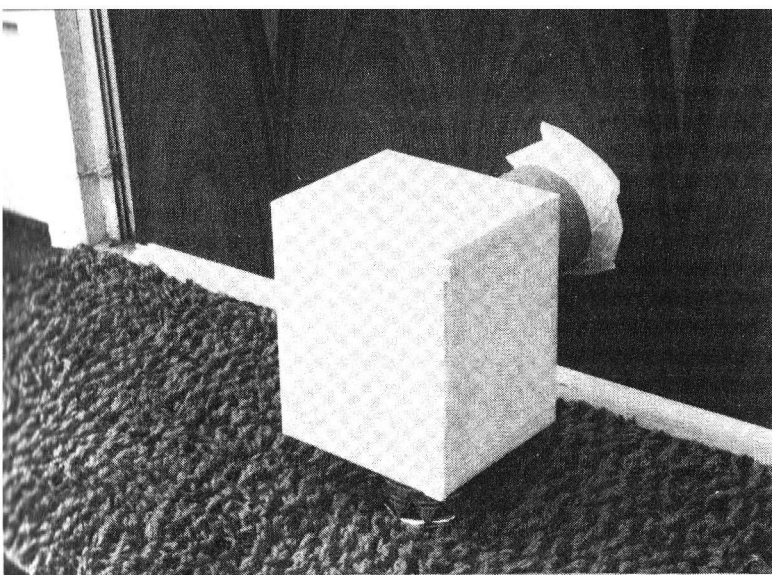
exhaust valve is to permit the escape of stale air when the shelter air pressure is raised by a very small fraction of a pound per square inch—in fact, by a fraction of an *ounce*. This little exhaust valve is the last part of our air supply system.

Our stale air exhaust valve consists of a small box for the valve body; a perforated soup can sticking up into the box from below as an inlet and flapper support; a piece of styrofoam taped atop the soup can as the valve flapper; and a cardboard tube leading from the side of the valve box, through a hole in the shelter wall, to the 'outside'. Note the penny glued atop the styrofoam flapper. Styrofoam is so light, it needed a tiny weight to ensure that the flapper would always close. The flapper will rise when shelter pressure is very slightly elevated above ambient, i.e., outside, air pressure. If a windstorm brews up outside and gusty winds try to blow in through the exit tube, the flapper stays put. Little or no unfiltered, fallout-laden air gets in.

By studying Figure 7 you can see that, like the other parts of our system, the stale air exhaust valve can be made from whatever's handy, so long as it's airtight. We punched triangular holes around the bottom of the soup can for stale air to enter. We taped the can securely into the box, then did the same with the cardboard exit tube. We tape-hinged the styrofoam flapper atop the soup can, then taped the box shut so that any air passing out of the shelter must pass through the triangular vents at floor level, up through the flapper, and then out of the shelter via the exit tube.

Finally, in Figure 8, we pushed the end of the exit tube through a hole in the shelter wall and taped it in place so that the valve stands on its inlet tube.

Unlike the valves in the pump, the stale air exhaust valve won't clatter much during operation. In fact,



you might want to install a piece of plastic or glass as a window into the little box so that you can inspect it now and then while someone operates the pump. If it never opens at all, start looking for leaks in the shelter while the pump is in operation. A few wisps of cigarette smoke might help you trace a leak. Otherwise, don't smoke!

You now have all the necessary elements for a minimal air supply system for two adults in a small shelter. It's a far cry from an automated system. In fact, if alone in your shelter, you could still be in serious trouble if you fell asleep for many hours.

Engineering texts on ventilation systems call for two or more air changes per hour in a meeting room—more for lavatories, locker rooms or assembly halls. They also call for roughly a thousand cubic feet of air, per person, *per hour*. Frankly, this approaches the upper airflow limit of our small demo unit even if

you kept it going all the time. Luckily, as the texts admit, these figures are greatly in excess of general practice.

How much in excess? Well, you probably needn't worry about CO₂ poisoning or sticky-wet humidity if you manage to get 400 cu. ft. of fresh air into the shelter per person, per hour. It's my personal suspicion that you could get by on a fraction of that when sleeping, or sitting quietly. But if you begin to feel headachy, dizzy, or drunk, get to work on the pump.

For a rough approximation of your pump's output, measure the outside dimensions of the pump when it is fully open, then find the volume inside. Next, bearing in mind that the pump doesn't entirely close down to half of its maximum volume, multiply the maximum by 0.4; in other words, take 40% of the pump's maximum volume. That's roughly how much air the pump gives you every time you open and close it fully.

Example:

Our pump box dimensions are 20" x 14" x 10".

Maximum volume, then, is 2,800 cubic inches.

40% of 2,800 cu. in. = 1,120 cu. in.

And since 1 cu. ft. = 1,728 cu. in.,

each pump stroke yields $\frac{1,120 \text{ cu. in.}}{1,728}$ of air,

which is roughly $\frac{2}{3}$ cu. ft. per stroke.

For those of you who think these calculations are too elementary: please knock it off, you guys. We want to make this clear enough for a smart sixth-grader.

Since we can operate our pump at about 20 strokes per minute without tearing it up, we find that our little demo unit will give us 14 cu. ft. of fresh air per minute, or 800 cu. ft. per hour. I think—but with so many variables of shelters, valve seals, and such I wouldn't swear to it—that you might get by with

three adults in a shelter using this little rig half the time. To put it another way: each of you three would probably have to operate our little pump for four or more hours every day to assure a decent air supply. That implies a lot of work, which means heavy breathing, which means elevated humidity.

As we said before, the pump provides more than just oxygen; it also keeps the humidity and temperature down to bearable levels in the sealed shelter by forcing out the stale air.

What if you're alone? There's no one to pump while you sleep, so you should choose a shelter that contains a thousand cubic feet of air, or more. And bring an alarm clock with you. Far better to be awakened by a clattering bell every two hours to pump for awhile, than never to wake at all.

No alarm clock? Lordy, what are we gonna do with you! Just remember that sand or water can be metered to trickle slowly into a container on a teeter-totter. When the teeter-totter shifts, it can knock something over noisily in approved Rube Goldberg fashion. Sure, this is all a lot of trouble. Why didn't you invest in good, commercially available equipment *before* the klaxon tooted?

No one is suggesting that the primitive life-support system illustrated here is any match for a commercial unit. To repeat: this article is for the ninety-five per cent of us who may know what we ought to do, but aren't doing it. It's easy to critique the system—and to make this one better.

The filter unit could be improved several ways: by being larger with more fine paper roll elements; by having a quickly resealable panel for fast replacement of paper rolls in case they become clogged; and by being more rugged than cardboard. Duct tape is stronger than the masking tape we used, but much more expensive. Buy some anyhow; tell yourself you're worth it.

The pump is the weakest link in our model; it should've been bigger. But even using the box we used, you could increase its capacity by altering the pattern for the bellows so the pump would open wider. We found that a single thickness of cardboard is almost too flimsy for the top face (the one with the handle) of the pump. A doubler sheet of cardboard, plywood, or even thin wooden slats taped across the flimsy top face would make it last longer.

You'll find that the pump's light weight can be a problem. It creates so much suction, the whole box wants to rise up when you lift the handle. If you don't want to wedge the pump in place on the floor, you could weigh it down. Just unseal the bellows, lay several bricks down on the pump's bottom face between the valves, then reseal the bellows. In that position the bricks won't reduce the pump's output, and they'll keep the pump from jumping around while you use it.

When we characterized this model as 'minimal', we weren't kidding. With only four paper rolls in the filter unit, airflow is so restricted that you must exert some effort to lift the pump handle. You'll be dog-tired after using it awhile. You'll wish you'd built a filter box with more roll elements so you could pump more easily. Well, you still can! Just build another filter unit, go outside briefly, and connect the filter units by a short conduit.

You could elect to build a filter without the paper roll elements. It won't purify the air as much, but it's much quicker and it makes pumping much easier. Of course, the flannel element can be quite large.

We won't go into great detail on the subject of negative-pressure shelters because they aren't as secure. But you could opt for such a system, in which the shelter air pressure is very slightly *lower* than ambient. Essentially, you install a stovepipe from

your shelter to the roof and install a simple, commercial wind-driven rotating ventilator atop the pipe. When the wind blows, the ventilator sucks air up and out of the shelter. If you taped a couple of layers of flannel over a window-sized opening into your shelter, the ventilator would do your pumping for you, drawing fresh air in past the flannel elements. The pressure differential in the shelter would be too low, however, for you to hope it could suck air in through paper roll elements.

Summarizing the low-pressure shelter scheme: it's attractive because it doesn't require you to pump by hand. On the other hand, it won't pull air through a really fine filter element—and besides, the low shelter pressure can draw unfiltered air in through crevices. Moreover, when the wind isn't blowing your air gets stale anyway.

Whatever system you use to provide fresh clean air in your shelter, what do you do if it proves less than adequate? Well, you trouble-shoot it to check for something clogging any part of the system. You breathe through a flannel (or something better) mask while the shelter is open to ambient air. You remind yourself that you're buying time during the hours when your system *is* working, because day by day the radioactivity of fallout particles should diminish. In forays outside the shelter, you wear gloves and all-enveloping raingear, leaving it just outside the shelter when you seal yourself in again. You treat clogged elements as radioactive.

Now we're getting into hygiene. What do we do about hygiene in a shelter, including disposal of body waste? How about lights and other niceties? We'll get to those topics in subsequent articles; for the moment, it's enough to know you can live under pressure.

—Dean Ing

COME PAST

by Richard Wilson

The Past looks mighty good,
sometimes . . . especially when you
only look at the good parts.



J. AULISIO

The water was so clear they could read the labels on the beer bottles at the bottom of the pond. John and Hallie Fowler had gone to the park for an hour of relaxation before they worked on the next issue of the ecology magazine that was the mainstay of their small publishing house. Discarded soft drink cans and other bottles lay in and near the path through the little woods.

"There should be a sign," John Fowler said to Hallie: " 'Please Don't Litter. For Your Convenience This Area Has Been Pre-Littered.' " They found a grassy mound to sit on.

A teenager went past with a portable radio at the end of his arm. He kicked a cola can out of his way. His radio, at full volume, was tuned to a contemporary music station where the latter-day Engelbert Humperdinck sang for all to hear.

"Noise pollution is as much a crime as some other things," Hallie said. "What happened to that law?"

"Nobody enforces it," John said. "What we need is a way to protect a person from the theft of his name." He intoned: "Forgive us, Engelbert Humperdinck, German composer, friend of Richard Wagner. You could not know that a pop singer would take your name and earn a fortune greater than you dreamed possible."

"Are you talking to me?" his wife asked.

"I soliloquize," John said. "If this is acceptable why shouldn't I publish stories under a world-famous name? I could be 'Joseph Conrad.' Name-taking has replaced name-dropping. It is condoned and applauded by millions who know the names if not the derivation. Another singer in Humperdinck II's stable is Tom Jones. Titles are in the public domain but

my Lord!—my Lord Jim?—is there no moral restraint? If Engelbert Humperdinck II and Tom Jones II are accepted, what is to prevent me, Joseph Conrad II, from writing a novel called 'The Brothers Karamazov.' Nothing, apparently, except good taste."

Hallie said: "Let's be fair. Robert Benchley called one of his books '20,000 Leagues Under the Sea, or David Copperfield.' "

"True," John said, "but Sly Old Bob wrote for a literate audience who knew when he was kidding."

A thin tall man passed by, walking slowly. He hesitated a moment as if to speak to them, then went on.

"What about the reporters? All those media names? Richard Wagner on CBS, not to mention James Polk. That list of yours."

He consulted his pocket notebook.

"Oh yes. Robert Nathan on National Public Radio. John Kennedy of New York. Interesting, isn't it?"

She read over his shoulder. "And that foursome from the Times—Les Brown, Wayne King, Christopher S. Wren and Ben A. Franklin. Is that coincidence or reincarnation?"

John shrugged. "I assume those are their real names."

The mail was there when they got home. John opened an envelope from the college where he and Hallie had met as English majors nearly 30 years ago. John made his usual comment about the good old days when mail was delivered twice a day. Hallie had gone to the kitchen to make coffee but ran to the study when she heard his cry of dismay.

"Oh no!" he cried. "Hallie, look at this!"

John was waving a brochure of poems by students

in the creative writing program. Hallie took it from his trembling hand. The cover proclaimed *Tomorrow's Writers*; under that were the words "edited and with a forward by Cletis Thurlong, Department of English."

Hallie blanched. "Forward for foreword? Backward is more like it." She thumbed through the beautifully printed brochure. The abomination was repeated on the contents page and on the foreword page itself.

"And by the director of the program himself," John mourned. "That's a kind of creativity nobody needs."

Hallie's editorial eye ran down the biographical sketches of the contributors. One student writer said he was enamored of the works of Jane Austen. That was what he meant. But it had come out another way:

"Jane *Austin*, as in Texas!" Hallie exclaimed. She had to sit down.

Their sensibilities as editors and publishers of Peripheral Press were forever being affronted, and not only by the deterioration of the language both loved and had worked with all their lives. They were in the permissive age they had resisted but which was becoming pervasive. There was a breakdown in the society that had once valued the worth and privacy of the individual.

Now they were disturbed by the fact that soon they would be living in 1984. That future probably would not be the one foretold by George Orwell; his prophetic novel had helped make that grim world unlikely. But there was another future almost as painful to contemplate. There were constant evidences of it. Hardly a day passed without some petty irritation, some new vulgarity.

Hallie back from shopping: "Can't we buy anything without a price stamped on it? Look at this orange." She liked to decorate the dining room with fresh fruit.

John snapped off the television set with a gripe of his own: "There's that damn promo again!" It was the one for The Newlywed Game where the master of ceremonies told the bridegroom: "Make believe your finger is a pencil and write on her forehead the one word you never want her to forget." The man had to guess the word his wife had already written on a card. John fumed. "So he traces the word 'Love' and says it aloud."

"That's nice," Hallie said.

"And his bride screams 'Stupid!' and hits him with her card. She'd written 'Sex.'"

Hallie shook her head. "It's a different culture now. I tried to find something for Timmy's birthday. Would you give your grandson a game called Cookie Toss?"

John grimaced. "There's no escaping it. I'd like to go back to a time when there wasn't a love song called 'Though I Never Laid a Hand on You My Eyes Adore You.'"

"Jean Shepherd had a phrase for that sort of thing—creeping meatballism."

"And creeping illiteracy." John brandished The New York Times. "Look at this—'naptha' spelled three different ways in the same article."

Hallie looked. "At least one of them is right. Oh, John, sometimes I feel that everything we do, in the magazine and with the books, is a lost cause. If you could go back where would you go?"

"Back to when we didn't wear other people's names on our clothes," John said.

"You mean that name on running shoes—that brand with the acceptable number of stripes?"

"And on ties," he said. "Once the maker had the decency to put his name on the inside; now you pay more to have it on the outside."

"Be fair, John. You have one of those ties yourself. Dior, isn't it?"

"No, dear. Mine has only initials. I whip it out when somebody shows up wearing one like it. Usually he's proud of how expensive it is. And usually he's one of those people who call me Jack."

"That's really not so unforgivable. What are the initials? I've forgotten."

"I believe you really have. They're C.M. and I pretend I don't know they stand for Countess Mara. Then I show him mine and tell him the initials stand for Charles Manson. I tell him I bought it at a garage sale for a quarter and that I save it for special occasions, like bear baiting and mass murders."

"Oh, John, that's the worst kind of reverse snobbery."

"Well, I get fed up, Hallie."

"There's the bell," Hallie said. "Who could that be?" She opened the door. "Oh. You look familiar. Don't we know you?"

John got up. "Hello again. You're the man in the park. Mr.—"

"Harry Protagonist," said Harry Protagonist.

"That's a name?" Hallie asked.

"It shouldn't be strange to you," the caller said. "Writers and publishers deal with protagonists all the time."

"Only generically so far," Hallie said. "Well, come in."

"I almost spoke to you in the park," the man said. "I chanced to hear a snatch of your discontent. I too condemn stealing the names of others. Nothing personal; I doubt that anyone would want mine. A purloined protagonist? Unlikely. And yet— You book people probably don't watch that unhappy medium, television—"

"Oh, we watch it," John said. "Just long enough to get irritated by it."

"Then you could have missed a short-lived series called 'The Man from Atlantis.' The title character—"

not the actor but the aquatic protagonist—had the name Mark Harris. You would think one of the hundreds involved in producing that eely epic would have recognized the name Mark Harris. True, he's only a writer but a writer surely known to Hollywood as the author of 'Bang the Drum Slowly.' After all, it was a film as well as his book."

"How do you know we're book people?" Hallie asked.

"Your fame is wide in this community to which you fled from Gotham. I have the feeling you'd like to flee again."

"What do you mean?" John asked.

"Solving personal problems is my line," Harry Protagonist said. "I'm a merchant of dreams. I can take you away from all this."

"Away from what?" Hallie asked.

"From your malaise in a world of mendacity and pervasive pettiness."

"What makes you think you know so much about us?"

"It is my business to know the wants of the people in need of my services. I am ready to help you."

John said: "Let us assume it would be a blessing to leave these idiocies behind us. How do you suggest we do it?"

"You will not leave them behind," Harry Protagonist said. "You will leave them ahead. I will take you into the past, to a time of your choosing."

"We know time travel is impossible," John said. "Isaac Asimov says so. Arthur Clarke and the physicists say so."

"There are ways other than those of conventional physics."

"Are you a sorcerer? A dealer in magic and spells?"

Harry Protagonist smiled. "I'm more like a merchant in mantras and smells."

"Meditation and incense? Are you proposing a drug

trip?"

"Drugs are old fashioned and inefficient. They leave you strung out and dissatisfied. Nor would such a trip have any real duration—you wouldn't last in the past. I offer no jerry-built journey but one based on neoscientific principles. Investigate my credentials and you will find I possess the requisite degrees and am a Fellow of the College de Pataphysique, founded in Paris in 1949."

"Good God," John said. "Alfred Jarry."

"Jarry," Hallie said. "The French playwright?"

"He had a rather quixotic view of the universe and the way it works," John said. "The science of imaginary solutions, wasn't it? We published one or two in his tradition—Raymond Queneau, Ionesco."

Their visitor beamed. "I am delighted to have such knowledgeable clients. And don't forget Italo Calvino and his protagonist Ofwfwq."

"So *that's* how you pronounce it," Hallie said. "But you're talking about writers."

"And also science, as your husband mentioned. You will find their learned articles in the pataphysical journal, *Viridis Candela*, along with one of mine on experiments in ozology, the science of smell."

"Nosology!" Hallie snorted. "Really!"

Harry Protagonist looked offended. "Ozology. Experiments in ozology. From the Greek *ozo*, meaning 'I smell.' Nosology is the Gilbert and Sullivan word. Please don't confuse me with John Wellington Wells and his mystic nosology."

John said: "Let's hear him out, Hallie. This is no dime store mountebank, necessarily."

"Certainly," she said. "But he knows we're bibliophiles and obviously he'd want to sound well-read. It's all right as long as he doesn't think we could be conned with bibliomancy."

"Bibliomancy?" John asked.

"Fortune telling by books, not unlike stichoman-cy," Hallie said.

"Oh," John said. "Like reading tea leaves. And there was that woman who read steel wool. But do go on, Mr. Protagonist. Tell us more about the science of smell."

"Ozology is an infant science," Harry Protagonist said. "There is little in the literature, although it is kaori-related. In Japanese kaori refers to detecting or exuding a pleasant scent. Unfortunately the English language makes no distinction between a smell and a stink."

"I have to correct you," Hallie said. "The scrofulous Dr. Johnson made the distinction when he told that woman she smelled—he stank."

"Yes, of course. But I emphasize the adjective pleasant. You can't have a pleasant stink, can you? Therefore I ask you both to recall smells from your past that have happy associations."

"I have to think," Hallie said. "Spices my mother used in her holiday pies. Nutmeg in the pumpkin, cinnamon in the apple."

"A good and pungent start. Who troubles to make pies at home today? Mr. Fowler?"

"The odor of a run-over skunk. It lingers long after your car has passed the spot. It's acrid but not entirely unpleasant."

"Excellent! Flaubert spoke of skunkery—*muflisme*—deploring the fact that his age was ruled by skunks. As you do, he abhorred the shoddiness and second-rate values of his age. We're making a good start."

"The smell of somebody else's cigarette," Hallie said. "When I met John he smoked Herbert Tareytons—the pack showed a man with a top hat and monocle. John gave me a puff but it didn't taste as good as his smoke smelled—sort of shaving lotiony."

"Girls in a railroad station," John said. "It was during the war. I'd been at a desert base out west; hadn't seen a woman for weeks. Then we shipped out and changed troop trains at this railroad station. My buddies and I talked about it for weeks afterward. The smell hit us as we left the platform and got into the big waiting room. It was the smell of women's makeup—face powder, perfume, lipstick—we'd forgotten how important it was and in the station it hit us all at once."

"Hot wax and onions," Hallie said. "My girl friend and I were driving through the Catskills in a sleet storm. Our windshield iced up faster than the wipers could handle it and we stopped at a country store. The owner sold us an onion; he told us to cut it in half and rub it on the windshield."

"Inside or outside?" John asked.

"Outside. But that didn't seem to work so at the next store we bought four short candles and set them inside the windshield, on the dashboard. Whatever the combination—they were religious candles—we got where we were going."

"How could you smell the onion if it was on the outside?" John asked.

"The other half was inside. We laughed and cried."

"Unusual winter smells," Harry Protagonist said.

"Cocoa butter at the beach," Hallie said. "Citronella at Girl Scout camp. The smells of summer."

"The way Hallie smelled when I first met her—at the beach," John said. "The warm, clean body smell. She has it yet and I love it still."

She smiled. "My bridal bouquet and the tang of orange . . ."

"Orange blossoms?" asked Harry Protagonist.

"Orange particles suspended in the air. We—" she looked at John, who said: "Oranges in bed. Peeling them and eating them. A respite from making love."

"Better than orange blossoms," Hallie said.

Harry Protagonist made notes as they reminisced. "I believe I have the makings of a formula," he said. "It is possible to synthesize many of the smells of your fond recollections. I shall return in a moment." He came back with a maroon carrying case and set it atop the papers on John's desk. He let down the hinged front to reveal racks of vials and apothecary jars holding powders and liquids. He poured a bit of this, sifted a smidgin of that. He held a vial to the light and studied it critically.

John said: "Hold on. We haven't said we're interested in your proposition."

"That's right," Hallie said. "Aren't you taking a lot for granted?"

Harry Protagonist smiled, either at them or at the pale concoction in the vial, which he swirled counterclockwise. "I hear the wish behind your words," he said. "In my trade one listens less with the ear than with subliminal senses—"

"This is mumbojumbo," John said. "You can't expect us to believe your toy chemistry set is a time machine. These are the 1980s, not the middle ages."

"True. But in your own middle ages you and Mrs. Fowler are at the edge of a certain year. Not the Orwellian year 1984 but a frightening personal bogey. It is rushing at you from the near future, unstoppable, inexorable—"

"Really, sir," John said. "We know what time it is."

"But do you understand the ways of time? The ramifications and bifurcations? Have you read Berkeley, Bergson, Borges?"

"Of course," Hallie said. "It's our business to read. There's also Bradbury. He made an attic a time machine, or one of his protagonists did and it took him back to the past."

"Bradbury the poet of science fiction," Harry Protagonist said. "I offer no time machine as such. Certainly nothing so spacious as an attic. I speak of

philosophical concepts. There is social time and esthetic time. In physics the negatron goes backward in time. There is the Buddhist concept and Puffa, the goddess of time and eternity. There is Leibniz and the argument of *thisness* and *suchness* and its link with the primitivist theory that through an identity of indiscernibles individuals may experience transtime suchness in a variety of ways."

John's eyes glazed. The swirling vial held him rapt.

"The olfactory is the least known of the senses," Harry Protagonist said as he studied the vial, then added a pinch of powder from a bottle marked B. "Having calculated the specific formula, we apply the Borgesian activator. *Et voila*, as we pataphysicians say, we have it."

The liquid in the vial bubbled placidly and confidently.

To John it seemed that Harry Protagonist had lizard-like eyes that did not go with the well-dressed, clean-cut look of the rest of him. Rather the eyes matched the costume their visitor should have worn, that of John Wellington Wells sketched by Bab. In his memory John Fowler saw the Gilbertian sorcerer as menacing in top hat, frock coat and skin-tight pants, with a wand that made evil magic. John recalled a verse, "pallid ghosts arise in hosts," and he remembered a friend who had dwelt too much in the past, neglecting contemporary concerns. The friend said shortly before he died, a bitter man, "Nostalgia can kill you."

John knew he was more tempted than he admitted by the prospect of going into the past on a happy wave of smells of honeysuckle and lilac, daylight and roses. But it also got dark there and moonlight could be menacing. John recalled the past in monotones, like an old movie or a dream. His dreams may have been in color but he remembered them in black and white.

Looking again at their visitor's heavy-lidded eyes—did they blink from the *bottom*?—John had a vision of a horrid creature crawling toward him through dim and fetid swamps of the past and he seemed to hear the voice of his dead friend say "Beware the Alligator Man."

John came back from his gloomy reverie to Hallie's laughter. "You were out of it for a minute," she said. "I thought you'd gone without me."

John blinked at Harry Protagonist's vial. He shook his head and said: "I'd never dare mention this to Harold."

Harry raised a questioning eyebrow.

"Our friend the chemistry chairman," Hallie said.

"Harold would be truly amazed," Harry said. "All the past is open to you. There are variables in suchness. There is even simultaneity."

"If we believed," Hallie said. "If we were to go—"

John stared at her for a moment. He said: "If—"

Harry said: "You have the means. All we require is motivation. Why would you go?"

They thought of all they wanted to escape from—petty gripes and major annoyances:

... I don't want to live in a world of deteriorating moral values, a world of kitsch and claptrap.

... where a modern state revives religious law, bans music and can stone a person to death for adultery or chop off his hand for theft.

... where a developer covets our rural acreage and would demolish the rambling old place that's been our home and office for 22 years.

... where there's a newsletter for the pornographic trade, and an advertising T shirt emblazoned "Purveyors of Fine Smut."

... where there's polyester in everything and the new bath towels don't absorb water but merely distribute it around your body.

... where the corner bakery, sealed off and aircon-

ditioned, entices you inside with a synthetic smell from an aerosol dispenser.

... where people have to take out loans to pay their fuel bills.

... I don't want a society that needs a National Association for Informed Depressives.

... I am sick of the selfconscious chuckles in coffee commercials on television. Why do Marcus Welby and Mrs. Mountain Groan think they're so amusing?

... I can no longer accept those anthropomorphic tuna commercials. I don't want my food talking to me.

"A sad litany, but splendid for our purpose," said Harry.

"I wonder sometimes if it's just middle-aged malaise," Hallie said.

"Tut," said Harry.

John said to Hallie, as if Harry Protagonist were not there: "If he were only a scam artist, a mountebank, I wouldn't be so troubled."

"You too? I have the uneasy feeling there may be something to it. But he's asked for nothing. Why?"

"Ask him."

"What do you get out of this?" she asked.

"Nothing, as you say, except that you are my first subjects in this phase of pataphysical research. Perhaps you'll publish my book."

"If your book is any good we'll publish it. That's the only way."

"I'd like that. A book by Harry Protagonist with myself as the small-p protagonist. How dadaist, how surreal. It has appeal."

"It has possibilities, Mr. Protagonist," she said. "We'd have to brainstorm the jacket copy."

"Call me Harry."

"Yes. There's no need to be formal. Call me Hallie."

"Thank you, Hallie." He smiled and turned to John. "May I call you Jack?"

"John, please," said John, frowning but extending a hand. "Nobody calls me Jack."

"That's the thing John is most adamant about, Harry. He's downright intolerant about certain names, and about people who can't spell, parse or punctuate."

John listened without demur and Hallie added: "What's more, he's smug about his intolerance. He froths over people who put apostrophes in 'Finnegans Wake' and 'Howards End' and O. Henry. His enormous, if specialized, learning sits rather heavily on him. You should hear him on the subject of our neighbors' mailbox."

"What do you mean?" Harry asked.

"Their name is Burns. Carl and Gladys. It used to read *The Burn's*. John paid them to replace it. Now it says *Carl and Gladys Burns*."

"Utterly incredible," John said. He began to cough.

"It gives him asthma," Hallie said. "One last thing. Don't get him started on people who can't spell Edgar Poe's middle name."

"Allan with two a's," Harry said. "I entirely sympathize."

"It could be an interesting volume of curiosia," John mused. "Not exactly what Peripheral Press does but we have come a long way since Macmillan bowed to scholarly pressure and gave up publishing Velikovsky." He smiled at last. "Just don't call me Jack."

"Tell me where in the past you'd like to go," Harry said. "You need adhere to no fixed time. It's all yours to skip around in. The times you visit need not be consecutive or chronological. I mentioned simultaneity—they can overlap. They may even have improved with age. Pick a day or a year. Or pick an amalgam. It can be arranged."

They voiced certain desires. He amalgamated their wishes into his formula and soon a faint mist rose in a corner of the room. It grew in size. At first it was gray,

but soon it was streaked in rosy pastels, wafting across the floor, enveloping them in a scented warmth.

"The colors of the past," Harry Protagonist said. "Predominantly pink."

His voice became faint as he faded from their sight.

There was one false start.

With Harry Protagonist they were deposited at the lower end of Wall Street. It appeared to be deserted, probably a Sunday. The leftover smell of roasting coffee and the existence of the Exchange Buffet placed it in time for John. As a young man he had worked in a big bank in the financial district and often lunched at the E.B., known as Eat 'em and Beat 'em because one paid on the honor system. The Exchange Buffet was a boon to those short of cash before payday: you ate as usual and said "Ten cents" to the cashier and your dime was accepted without question; the next day, affluent again, you said "A dollar even" after your fifty-cent meal to reply his thrust.

John and Hallie walked up the empty street toward Trinity Church. Harry Protagonist, frowning, went on ahead of them.

"Maybe he thinks we need a spiritual start," Hallie said.

"Something could have gone wrong—"

Harry whirled and ran past them, crying: "Save yourselves." Behind him, from around a corner, thundered a snorting beast.

"Oh my!" Hallie said. "It's the bull from the brokerage house commercial!" It raced past them, hard on Harry's heels, then disappeared around another corner.

Harry rejoined them, panting. "Sorry," he said. "That wasn't quite right."

Hallie said with a little laugh to cover their disappointment: "Oh well, what's one bum steer? As

you're fond of saying, John, it's better to travel hopefully than to arrive."

"So much for ozology," John said.

Harry was apologetic. "I said it was a science. I didn't say it was an exact science."

Back at the Fowlers' Harry recovered his composure. "We learn from accidents," he said cheerfully. "I did say you're my first subjects."

The rosy mists were fading as Harry prepared a new vial.

"Wait a minute," John said.

"You're right," Harry said. "No more than a minute to reestablish the conditions." He talked fast, twirling the vial:

"Perhaps I failed to mention an important ingredient, called *ertia*. You know about inertia, which makes everyone a time traveler. Through inertia you travel forward in time like everybody else. You need *ertia* to go backwards, to upset to the chronological currents, admit you to an eddy of events spiraling horizontally so you step sideways from any part of time to any other. This is my pataphysical force that negates our natural straightforward gait. Bergson hinted at it. He regarded time as a continuous flow, with past and present inseparable to consciousness and memory."

"It's no good citing Bergson or any other B," John said. "Admit that you failed and leave us alone."

"Then consider someone more contemporary—Conrad Richter and 'The Waters of Dronos.' Surely he was a subconscious pataphysicist—"

"Now you're being absurd. I half believe you're mad."

"Eccentric, perhaps," Harry said sadly. "Please, John—"

"I won't have Hallie exposed to danger again through your eccentricities."

Hallie interrupted. "You sound like children, both of you. Give him another chance, John. Our reasons for going are still valid. Trust him one more time."

"Give me a good reason," John said. "Just one, Hallie."

"Well—" She stopped to think. John could not be swayed by logic now, if there was logic in any of this. She needed an anti-intellectual lever, one that would work on his emotions and prejudices. "Well, John, like you I resent wearing other people's names on my clothing. Like your Countess Mara-Charles Manson tie, I don't need Vera's name on my scarves and skirts, and my jeans don't need a metal plate on the rump advertising that other designer."

John looked confused. "What jeans?"

"I showed you the ad in the Sunday Times." She took a deep breath and said distinctly: "I don't want Bill Blass in brass on my ass."

"Now, Hallie."

"Now is right. It's part of the permissive vulgarity of the present. If Jimmy Carter could say he was going to beat Ted Kennedy's ass—"

John smiled. "All right, dear. You win."

"Do we go?"

"We go."

"Trust me," said Harry Protagonist.

John remembered emerging sleepily one dawn from his fraternity house after waking to the sound of a car passing and repassing in the street. It was worse than that—the car was roaring backwards round and round the block. He recognized the driver as a fraternity brother, Slim Winkler. Finally he identified the pennantlike things streaming backward from the headlight supports. They were brassieres. He waved Slim to a halt. The explanation was logical. Slim had rented the car for a night on the town. He visited a roadhouse and another kind of house, each a consid-

erable distance away. The mileage charges were more than Slim could pay. But he found that when he backed up the odometer reversed itself. Slim had a lot of miles to unwind and the streets around the frat house were wide and empty. He'd got the knack of driving in reverse, one hand on the wheel, head out the window, mileage going down at a steady rate. "Mustn't overdo it, though," Slim said. "Be suspicious if I turned it in with fewer miles than when I took it out. Couple more times should do it." And he was off again.

It was like that, John thought. He and Hallie were whirling backward through time, through the years and then the decades. They could almost see major events flash past them in scenes, symbols and slogans, in reverse. Skylab falling, the gasoline crisis, a Ford WIN button, Nixon's resignation, Watergate, LBJ and Vietnam, the assassinations of Martin Luther King and the Kennedys, Quemoy and Matsu and John Foster Dulles' threat to unleash Chiang Kai-shek. VJ Day, Nagasaki and Hiroshima, VE and D Days, Pearl Harbor, the Phony War, Hitler.

They found themselves, as if a stage manager had shifted scenery around them, in a street off Times Square. It was the theater district, night. Cars of a once-familiar vintage discharged passengers. Big old fashioned roomy taxicabs labeled 15/5 weaved in and out. Marquees glittered with naked electric light bulbs. John and Hallie watched people push past them as curtain time neared.

"Where are we?" John said. "*When* are we?" He tried unsuccessfully to see the year on a license plate.

"The tickets in your hand," Hallie said. They could make out the name of the theater, the day of the month, but the year was smudged. A ticket taker in a tuxedo said "Good evening" and returned their stubs. An usher gave them programs and led them to seats

in the third row center. The orchestra leader, in tails, was conducting the pit band in a vaguely familiar overture. In the audience voices buzzed in a soft cacaphony of expectancy. Hallie caught the words "first night . . . Kern." She whispered to John: "What's the show? I didn't—" John whispered back: "Neither did I." He slipped the programs into his pocket. "Let's not look. Let's be surprised." She nodded and squeezed his arm. The curtain rose.

At Sardi's later, Hallie said: "You *still* haven't looked at the program. How long must we wait? We never saw the show, I'm sure. But that song. Oh, John!"

Someone at a nearby table was singing it wordlessly—"All the Things You are." John said: "That was our song for so long."

"It still is, for me."

"And me."

"I know why we never saw the show," John said. "Aside from not having the money. It closed so quickly. I think—yes, it was 'Very Warm for May.'"

"Of course! With Jerome Kern's music it should have run forever."

"The song has."

"If only we could tell these people that," she said. "And Sardi's! We couldn't afford that, either. Do you believe Harry Protagonist now?"

He smiled and took her hand. Not until they had had their splendid supper did they look at the program.

John paid their bill and they took a room in the Astor Hotel.

They had breakfast in bed for what coffees would have cost in the world they had left.

. . . They took the subway, putting nickels in the turnstile slot, for a clean, safe, comfortable ride to South Ferry, where two more nickels took them across to Staten Island. On the ride back they stood at

the railing, whipped by the tangy wind, and kissed like young lovers.

... They rode up Fifth Avenue from the Washington Square arch on the open top of a double-decker bus.

... They saw the Ritz Brothers on the stage at Loew's State, reveling in the mad song-and-dance and parody acts that had made the trio vaudeville headliners in the years before Hollywood got them.

"Aren't they just delicious!" Hallie said. "What a shame Hollywood used them up so fast."

"Good old Loew's," John said. "Only most New Yorkers called it Loewy's. Remember the ads? M-G-M tried to correct the pronunciation: 'Loew—and Behold.' "

"It didn't do any good, did it? Everybody said 'Loewy and Behold.' "

"And later when Hollywood moguls thought up the slogan Movies Are Your Best Entertainment, they realized the acronym was MAYBE."

... They bought the newspapers for the good old features: John Chapman's Mainly About Manhattan column in the Daily News. The first appearance of Dick Tracy. Hairbreadth Harry and Thimble Theatre. F.P.A.'s column. Evangeline Adams' astrological advice. Fontaine Fox's Toonerville Folks.

"The skipper of the Toonerville Trolley That Met All the Trains," John recalled. The Terrible-Tempered Mr. Bang. Aunt Eppie Hogg, the Fattest Woman in Three Counties."

"I loved Aunt Eppie. She was so accommodating."

"And Mickey 'Himself' McGuire, the head of the boy gang. Did you know that an actor named Joe Yule Jr. took the name Mickey McGuire but had to give it up when Fontaine Fox sued? He changed his name to Mickey Rooney."

... They saw Robert Armstrong and Fay Wray in "King Kong" at Radio City, where it was playing at both the Music Hall and the Roxy. "Too Big a Movie

for One Theater," the ads proclaimed.

... Dorothy Parker, as Constant Reader, reviewed books for the New Yorker. She panned "Winnie the Pooh," saying "Tonstant Weader fwowed up." Hallie, and A.A. Milne fan, said: "I admired Dorothy Parker for a lot of things but I was disappointed in her for that."

... They went again to Broadway to see Borrah Minnevitich and His Harmonica Rascals.

... They listened to radio—Stoopnagle and Budd, Lowell Thomas, Amos 'n' Andy and The Witch's Tale, and songs by Rodgers and Hart and Cole Porter and Nacio Herb Brown, and Dizzy Dean describing how a ballplayer slid into third.

... They saw a sign at a filling station: "Gas 7 gals \$1." Tomatoes were cheaper too, as Eddie Cantor sang, and so were bread and eggs and hamburger.

"Are you glad we came?" Hallie asked John.

"Certainly. But I'm puzzled. We've been here less than a week, but these things didn't all exist at the same time. It's unreal."

"It must be the simultaneity principle Harry talked about. The amalgam."

They seemed to hear Harry Protagonist, sounding like a tour guide: "Unlikes attract, likes repel. Repulsion is strongest when there's a chance of running into yourself, or someone you knew then." John said, "I didn't know I was repulsive to myself" and Harry replied "Only in the pataphysical sense. You can see and have interpersonal relations with strangers, as long as no one changes the future, but you can't be seen or heard by people you have known, or by yourselves as you were then."

"And things overlap, he told us," Hallie said to John. "We're in the lap of the past. Don't you find it comfortable?"

"I'm having the time of my life."

"Saroyan's play." She smiled. "Let's try to see it."

"This is where I lived when I was a little girl," Hallie said. "RKO Keith's is around the corner. I knew the manager's son and one day after a Karloff movie ended its run he sneaked a life-size papier mache mummy into my closet. It nearly scared me to death when I saw it behind the clothes. I didn't speak to him for a month after that. And you can believe my parents didn't give him the run of the house any more, either."

Hallie and John had taken the Broadway-Brooklyn El to Richmond Hill. It was an old two-family house at the end of Myrtle Avenue, where the trolley car motorman reversed the pole and carried his gear to the other end of the car for the trip back to Brooklyn.

They went in at the front of the house. "We always used the side door up the steps into the kitchen," Hallie said. "This is the front room where we watched the radio. I mean listened to it. I guess we watched it too when we all got together after supper for Lowell Thomas and Amos 'n' Andy. Funny; nobody looks at the radio now except to turn it on or off."

A pleasant-looking woman in her middle thirties was dusting the Seth Thomas clock at the center of the mantelpiece. As they watched, the woman opened the glass over the face of the clock and wound it. She paid no attention to them as she turned the key clockwise at the left and counterclockwise at the right, then closed the case and returned the key to its place.

"It's an eight-day clock and Mother's the only one who ever wound it," Hallie said. "She wound it Wennesday and always after ten so the hands would be up out of the way."

The woman went on with her housecleaning. John said: "We might as well be ghosts for all the attention she's paying to us."

"We are, in her time. She's the ghost now, poor Mama. She died so young. I'd forgotten how pretty she is—was."

A bell rang and the woman went toward the back of the house. They heard a man's voice. "Maybe it's Dugan, the bakery man," Hallie said. "We always had pecan rolls on Wednesday. He had specials on different days. One was tomato bread."

John laughed. "Tomato bread?"

"I hated it. You didn't know it was pink inside till you sliced it. Mama believed in health foods. She listened to John W. McCann on the radio. It wasn't the taste so much as the color. But we had other kinds of bread too."

They heard Hallie's mother say: "Well, come in. Sit there at the table. I'm sure we can manage something. Bacon and eggs all right? Home fries? Coffee first; here." The man murmured something. Hallie's mother said: "Nobody goes away from this house hungry."

"It's not the Dugan man," Hallie said. "Let's go see."

A thin pale man was sitting at the table. His clothes were clean but not pressed and were terribly worn. He had no coat. The woman poured a glass of milk and he said "No, no" but she insisted. "Drink. There's strength in it."

Soon she had filled a plate with the potatoes, three eggs and half a dozen strips of bacon. She set it in front of the man with thick-sliced rye bread and butter and a bottle of ketchup. The man said thank you and started to explain.

"Don't talk. Just eat."

He began to eat politely, taking little mouthfuls, but then wolfed the food. Hallie's mother watched with satisfaction, standing near the gas range. She refilled his coffee cup. He mopped up the last of the egg yolk with a piece of bread.

"I remember now," Hallie said. "He was walking from the VA hospital. A long way."

"Are you here too?" John asked. They were standing at the doorway of the dining room with its big china closet and sideboard. "I'd love to see you as a child."

"I'm at school. Mama told me about it when I came home to lunch."

Hallie's mother went to the pantry and came back with a wide slice of apple pie. "Left over from supper," she said.

"I couldn't eat anything more, ma'm. Really."

"Try, to please me."

He managed, while she went past them to the dining room and came back with a cigarette that she put on the table.

"Oh, I couldn't smoke in your kitchen," the man said.

"Of course you can. My husband does." She went out of the kitchen again, upstairs this time.

"Isn't she concerned about being alone in the house with a stranger?" John asked.

"She's a good judge of people," Hallie said. "Besides, Daddy was in a VA hospital, off and on."

The man moved his chair back from the table, then craned his neck to be sure he was alone.

John said: "I think he's going to steal something. Did you miss anything later?"

Hallie shook her head and frowned at her husband. The man reached in his pants pocket and took out a handkerchief. He blew his nose, then quickly dabbed at his eyes. He was taking a last drag at the cigarette when Hallie's mother returned with a topcoat. "It's not all that warm for you to be walking around in your shirtsleeves," she said. "It's seen better days but there's still a lot of wear in it. And here's a nickel for the subway."

The man got up. "I couldn't. I ate your meal be-

cause I needed food. Thank you again. But I don't need the coat and I couldn't take it."

"You can and you will," she said, and while he was protesting she helped him into it.

"I do thank you. I'll never forget this." He went to the door and opened it.

"Take the carfare."

"No, ma'm, that I will not do."

"Please."

"I've never took money from anybody and I'm not starting now. Goodbye and bless you." He was gone.

Hallie's mother looked out the window after him and smiled when he turned at the street to wave. then took the dishes to the sink.

"Why didn't she make him take the money too?" John asked. "Where was he going?"

"He was walking to Manhattan. He didn't say why but he must have thought there was something there for him."

"Manhattan is a long way from Queens."

"Yes and Mama must have realized he had to get there with all the pride he still had."

John watched the woman at the sink. He realized that everything in the house was clean but that some of it was mended and some was shabby.

"I hadn't realized the depression was like that," John said.

"Not all of us had your advantages," Hallie said.

"Rescued you from the gutter, did I?"

She smiled. "Genteel poverty. Lots of us wouldn't take a nickel we hadn't earned. No, not the gutter. We were the lucky ones."

"We've seen something of your childhood," John said. "Now let's eavesdrop on mine."

... "Who is that boy in the knickers? Oh, it's you, John; you were cute!"

"An upstanding young lad, if I say it myself."

"And who are you with—the boy with the pimples?"

"That's Robby Wompers. I'd forgotten him. We called him Rompers."

"What are you doing?"

"Probably going to the candy store on the corner."

The boys stopped to whisper and young John nodded. The untended newsstand outside the store held a feast of reading matter. Dozens of magazines with gaudy cover illustrations were racked behind piles of daily newspapers.

"People read so much before there was television," John said. "Look at all those papers; there were eight or nine of them then. The Sun, the Journal, the Daily News, the Mirror, the Herald-Tribune, the Daily Worker . . ."

Hallie said: "John, what are you doing!"

"Just reminiscing—"

"No; young John. Look, he's scooped up all the change from the tops of the newspapers."

"Oh. Just taking it inside to the owner. Watch; he'll give it to the man."

Hallie had hurried them close. They saw clearly what young John was doing. "John, you're not giving him all the money. You're palming some of it. Oh, John, you're *stealing*!"

He found it hard to meet her eyes. "Yes, I was. What's worse, Mr. Elkin probably realized it and said nothing because he knew my parents. I'd forgotten that little incident."

"Buried it in your subconscious, more likely," Hallie said. "Look, now you're buying candy with the stolen money."

"Yes, and sharing it with Rompers, my partner in crime. He was my teacher."

"I hope you reformed after that." She spoke only half banteringly. "Did you?"

"Not till I was almost caught."

"By Mr. Elkin?"

"No, but it was the same day. Let's follow the young criminals to the five and ten."

Inside the Woolworth's young John went nonchalantly from one counter to another, picking up items, looking at them, putting them back down and moving on, while Rompers stood just inside the door.

"Rompers is the lookout and you're the thief," Hallie said. "Oh, John!"

"Watch him, the scalawag," her husband said. They were at the boy's elbow, observing invisibly as he picked up a pencil case and put it down, then picked up a camp knife and didn't put it down. The boy slipped the knife in his pocket as the manager walked up to him; Rompers had fled.

"What are you doing, son?" the manager said to young John.

"Just looking."

"You haven't got anything that doesn't belong to you?"

"Oh no." He showed empty hands.

"Take out the contents of your pockets."

The boy slowly obeyed, pulling out a quarter . . .

"Part of his loot," Hallie said.

. . . and a pencil stub, and a handkerchief . . .

"He's just not going to take out the knife," Hallie said. "Oh, the sneak!"

"Wait. He's cleverer than that."

. . . and a knife.

"Where did you get that?" the manager said, reaching for it.

"It's mine," the boy said. "You don't sell these here." And he showed the man the scout knife with the official BSA emblem on the bone handle.

"There!" Hallie's husband said. "He got away with it."

"Don't sound so proud. You *did* take the Woolworth's knife. Why, when you had a better one?"

"Just to see if I could do it, I guess."

"And the money from the newsstand? Your folks were well off. You didn't have to steal."

"I know. And I never did after that."

The manager walked the boy to the door, obviously still skeptical. "Next time don't act so suspicious," he said to young John. "Don't touch anything you don't intend to buy."

Hallie and John watched the boy stroll nonchalantly to the corner, then race around it to join his companion, pulling out both knives and yelling "I got it! I got it!"

Hallie asked: "Are you sure you reformed? You don't act it."

He said: "I had to keep up appearances for Rompers. I was really scared to death I'd be arrested. I went straight after that. Of course it helped when Rompers moved out of the neighborhood."

Hallie wished he sounded more repentant. Still, she felt he was more troubled by the half-forgotten incidents than he'd been willing to admit.

"I was a child here when the horse barn burned," John said. "Was it Dugan's? I can't remember. But it was on this street—Kosciusko. That was before Polish names were in Papal vogue. And I can still spell it."

He did and got it right. Hallie could just see the street sign on a corner.

John said: "Up the block, I think. My God, there it is!"

They were drawn to it despite themselves. Wooden sawhorses diverted traffic. He spoke "saw horse" aloud to remind himself that high school speech lessons had not completely erased his Brooklyn accent. He still said "sore hawse." He also had trouble with lawn ornament, which came out "lorn awnament."

Firemen in rubber coats and helmets played water on the smoking building. A policeman, notebook out,

was regarding a dead horse that didn't look burned at all as it lay on its side with legs stiff out and belly distended.

"The poor beast," Hallie said. "So horrible."

"Yes," John said, "but all I can think of is the old joke. The policeman couldn't spell Kosciusko so he had the carcass dragged around the corner to Reid Avenue."

"Odd what you remember," she said. "I would have thought the terrible smell—"

"I must have put that out of my mind." The stink of death assailed them. "It's the most awful thing I ever smelled. Let's get away from here."

True to the joke, Reid Avenue, where the trolleys ran, crossed Kosciusko Street. They turned the corner.

She murmured: "If the horse is a death symbol what does a dead horse signify?"

Now he realized that a lawn ornament, in a church setting, could be a tombstone. "Never mind the mysticism," he said, only half to her. "Here's a trolley. Let's just get away."

They boarded the street car, not knowing or caring where it would take them.

It connected with the El train that wended its way into Queens, through Hamilton Beach and The Raunt and along the narrow two-track causeway over Jamaica Bay to Rockaway. Hallie put aside a newspaper John had bought. It was *The Sun* ("It Shines for All") and she had found Fontaine Fox's Toonerville Trolley cartoon.

The fishy smell of the bay yielded to a clean ocean breeze. "Here's Rockaway," John said.

They were strolling the boardwalk, eating hot dogs and enjoying the easy exercise and the sea-tempered sunshine, when they came upon a miniature Midway. They took a spooky ride on the Haunted Train, got lost in the Maze of Mirrors, ate cotton candy, decapi-

tated clay pipes at a shooting gallery and found the side show. The fading canvas banners glamorized attractions within—the India Rubber Man, the Pinheaded Boy, the Veiled Dancer, the Knife Thrower, the Fat Lady . . .

"Aunt Eppie Hogg!" Hallie said. "I want to see her."

John bought tickets from the straw-hatted man with the cane. It was close and dusty inside. They moved with others from platform to platform, past Giant George and Tiny Tom, the armless man who threaded needles with his dirt-caked toes, the Fat Lady ("Eppie Hogg has more dignity," Hallie whispered), past the contortionist, the Half-Man Half-Woman and on to the Alligator Man.

The exhortations of the talker outside, punctuated by slaps of his cane, had swelled the crowd in the hot canvas cavern. Hallie and John were pushed forward to the edge of the platform where the Alligator Man, wearing only a stained once-white loincloth, reclined on a bench. His skin, from the neck down, was a mottle of hard-caked scabs, gray and flaking. An odor of decay flowed from him; it offended John's nostrils and started the undigested hot dog churning inside him. John gave a little groan and leaned against Hallie, then slid to the dirt floor.

As he came out of his faint, a derby-hatted man in a greasy red vest was hauling him to his feet despite Hallie's objections, muttering around his cigar, "Come on, get up. What are you trying to do, ruin the show for these people?" The Alligator Man looked out under granulated eyelids. "Yeah, get him out of here. He spoiled my act."

Hallie saw that John was able to stand and gave him a handkerchief. John pressed it to his nose, grateful for the scent of lavender that filtered the stench of decaying, unwashed skin.

"Act!" John said as people made way for him to

move toward the exit flap, Hallie supporting him. "He belongs in a hospital, not on display."

The man with the cigar said "Let's keep it quiet, mister, all right? Here's your money back and that's the egress, if you get my meaning."

They went to a bench on the boardwalk to help John recover. He said: "Now I know why I've always disliked side shows, freak shows, congresses of strange people. I couldn't even read 'Nightmare Alley.' "

"Don't think about it," Hallie said. "Enjoy the breeze. Take deep breaths."

"The past is beginning to pall, isn't it? Or is it just me?"

She patted his hand. "It's gone past," she agreed. When he looked puzzled she said: "It's a country expression for food that's begun to spoil or turn sour. That may be what's happening to us."

"Euphoria took us here. Memory is so selective and we forget too much. It's not as clean as in our time. Few people use deodorants. 'You very imperfect ab-lutioner.' Gilbert again."

"No Pampers, and dirty diapers piled up in the bathroom," Hallie said. "Garlic in the subway. Galsworthy said: 'He smelled, as it were, of old days.' "

"Petty things too. Drying razor blades so they don't rust. Sharpening them on the inside of a glass."

"It is a bore being back. I'd forgotten how oilcloth cracks and discolors. Boiling handkerchiefs on the kitchen stove. Mother wasn't all that heroic about poverty. She met it with a smile in public but you could also tell she was bitter. Sometimes when she woke me she'd sing 'Mary, Mary will you get up—we need the sheets for the table.' "

"As bad as that," John said.

Hallie bristled. "She was making a joke."

"So was I. Sorry."

"Actually Mother changed the sheets every week—halfway. The bottom sheet got washed. That was before fitted sheets. The top sheet went on the bottom, with a fresh one over that. Oh, John, are we getting on each other's nerves? We're like fish out of water in this past that's no longer ours."

"Let's blame Harry Protagonist, not each other," John said. "Him and his smells. 'Why stinks the goat on yonder hill if he's so full of chlorophyll?' "

"He's full of something," Hallie said. "But let's be fair; it's more our past than his."

"I'm ready to put it behind us. Are you?"

"Yes, but how? We were so eager to get here—not really believing it possible, certainly not permanent—that we never asked how to get back."

"It's possible we don't need Harry and his phony physics," John said. "We're only half here, semi-detached from participation, powerless to change anything significant. We have to reverse his time-reversal."

"He used smells and spells."

"Or said he did. Let's put our minds to it—why we want to go back. Let's evoke things we've left undone."

"Don't you mean invoke?" Hallie said. "The magic of memory. Future memory?"

"Evoke, invoke. All that matters is to revoke this twice-told past."

"I want to see my grandchild. It's barren here without him."

"And I want to put things in order for him," John said. "There are books to be published, the business for him to carry on some day."

"Let's revoke, then. Anything may be possible. It was impossible for us to get here. So cancel the 'im.' Just like algebra. Not smells but sounds? I'd like to hear Seiji Ozawa conduct again—with that boyish exuberance."

"Right. Think of sounds that don't exist in this half-past yesterday. A moon rocket taking off."

"New songs from Stephen Sondheim."

"Good. But not only sounds. All the things we were and are and will be up in the eighties. A new Salinger story; it doesn't have to be a novel. A new Fellini film."

"Lena Horne singing 'It's Not So Easy Being Green'—Kermit's song."

"Yes, and whatever else the Muppets are up to after having Baryshnikov do the ballet from Swine Lake."

"And see Lynn Swann receive an impossible pass. Don't they call him the Baryshnikov of football?"

"I didn't know you cared," John said. "Yes. Swann makes it seem like ballet. That's the way. Invoke the sounds and the names of the time we belong to. I want to get back to when performers use their real names instead of press agents' creations—Leslie Uggams and Carrie Snodgrass. Meryl Streep and Wayne Sleep."

"Wayne Sleep?"

"He was Clean Willie in 'The Great Train Robbery.'"

"Of course. You did teach me to watch the credits at the end of a movie."

"Right. Let's not lose momentum. I want to see the next big breakthrough in the control of disease. A cancer cure—"

"I'd be happy if they'd just shut off my sinuses," Hallie said.

"Be serious. We have an obligation to our own time. We mustn't shirk it just because we don't like the way things go. It's our duty to hand the world on to new generations better than we received it. Do our best, anyway."

"Maybe in our lifetime we'll free ourselves from an overpopulating Earth. We'll send people to other worlds, not just machines."

John said: "And maybe find an alien spark of life that leads to a different evolutionary process—a higher level of mankind."

"Now we're getting outside ourselves—not thinking selfishly."

Then they were literally outside themselves. Somewhere below them a middle-aged couple sat on a seaside bench but they themselves were high in a changing dimension. At first it had been like walking into the wind or swimming against a current. They struggled to make headway but they moved forward as a natural order reasserted itself. They were going the way time normally went.

Things around them lost shape and definition. A thousand calendar leaves fluttered by in a montage of times and places. An infinity of images fought for attention. They were in a swirling trajectory that pulled them into a limbo of lostness. Sounds and voices smote their ears, banging and prattling in a madness of motion and emotion.

It was as if Time the Father, who had suspended proper progression to let them wander in many of his domains, had readmitted them to the forward stream.

At first they tumbled together but as inertia again took hold they were separated. They saw and heard each other but no longer had contact. "John!" she cried. She heard him call her name but then his voice was lost in the babble of time-sounds.

Then Harry Protagonist was hurtling beside them through the howling blur. She heard his shout: "You detached yourselves without my guidance. You should have waited for me."

"We found our own formula," Hallie said. John seemed to be talking too but she couldn't hear him.

Harry Protagonist's sarcasm competed with the chaos of the time torrent. She thought she heard him cry: "The time travel profession is in its infancy and

already it's overrun with amateurs."

Though John was clearly visible to Hallie in the chaos of nontime, he was whirling away from her. She caught snatches of what he was saying. He seemed still to be evoking-invoking the future, their previous present, formerly their now, in a kind of chant, in an incantatory way. His words, distorted by the cyclonic wind, reached her in scattered bits. They made a strange sense:

Open up that fateful door to nineteen hundred eighty-four.

Eric Blair won't be there.

Ride a cock horse to Bradbury Cross.

This way to the regress.

Beware, beware of Berkeley Square.

Bill Blass, get off my ass.

Berkeley, Bergson, Borges and Brad—Don't you think that we've been had?

The Einstein Express Don't Stop Here No More.

Alas, All Thinking, let's get stinking.

Don't pollute the time stream.

Then she lost him.

The maelstrom modified for John and as he shuddered to an uneasy drift he saw a revolting creature. It was the Alligator Man, crawling through the mists of a swamp toward a vast tree that reached up with an infinity of branches into a gloomy sky.

John did not see Harry Protagonist but heard his voice. It was faint and bookish. "I didn't explain sufficiently about ertia. When ertia is nullified or overridden, as it was by your unprogrammed incantations, it reverts to inertia, which has no sense of direction, leading everywhere and nowhere."

John thought "Is this exposition necessary?" and the cold eye of the Alligator Man seemed to wink at him, from the bottom up, in a companionable way. Harry's apologetic voice trailed off.

John tumbled toward the great tree. He passed among its leafless outer branches and saw that they grew thicker as he neared the mighty trunk. He drifted lazily now and one branch went by almost within reach. He brushed against another and caught a third. Gasping, his heart pounding, he clung to it and managed to straddle it.

The bark was mottled like an alligator's hide ("Hide, hide, the 'gator's outside!") but comfortingly wooden. He pulled himself along its upward slope, almost shinnying, until it became less vertical, then broadened. Now he could walk along it without fear of falling. There were leaves on the lesser branches. As he walked his solid branch it became horizontal, a high road through a tulgey wood. Did it lead everywhere? Anywhere? It was a wide respite from his panicky flight. Despite the height, he felt solidly on earth.

He wondered: Why doesn't respite rhyme with des-pite? Or height? His word sense was skewed. Askew. "I, askew," he thought. "I ask you." But there was no one to ask and he did not speak aloud. Was it allowed to speak aloud? Why did that question occur to him? That query? Queer. He began to feel less comfortable. Not easy but queasy.

Words whirled in his mind. Words that conjured up smells had whirled him to a past world. Then the world whirled out from under him to return him—where? He was wary of where. 'ware the whirled world! Be-ware! Be where? It had made sense to follow the scents to a happier time but now it was senseless to have gone and returned—to be where? He slapped his thighs in exasperation but noticed no jingle of coins. No cents. When he was single his pockets would jingle. But they didn't and it made no sense to be single—to be without Hallie. Where was she? He longed to hear her voice, to speak to her, to have her share his frustration. He wanted to cry out.

He opened his mouth to call to her. He was unable to speak. He was mute. Dumb.

Hallie had no trouble getting back. Soon after she became separated from John the time storm abated and inertia deposited her gently in front of her house. She let herself in but her husband was not there. His desk was in its usual clutter but Harry Protagonist's belongings were gone.

She waited an hour, going often to a window to see if John had come. Finally she thought of the radio. Its digital face told her it was late in the afternoon of the day they had left for the past. She turned to a newscast but it told her nothing. She considered calling the police but realized there was nothing she could tell them. Her husband was a missing person but he was not likely to be anywhere in their jurisdiction.

She made a light supper and ate from a tray in front of the television set. The 6 o'clock news had nothing about John Fowler or Harry Protagonist. She looked in the telephone directory but Harry wasn't listed. She turned back a page and found Peripheral Press. Thank God that hadn't changed. Then, with foreboding, she turned to the F columns. Fowler, Jason; Fowler, Jennifer; Fowler, Joseph P. No Fowler, John. For a moment she couldn't breathe. But there was a Fowler, H., with her address and telephone number in the precautionary way some women who lived alone preferred to be listed.

Hallie felt numb. When she could think again she went to John's desk. Quickly she realized it was not his but hers. All the papers and accounts made it clear that she had been carrying on the business alone for a number of years. She was another Hallie Fowler in a different dimension of time whose husband had disappeared without trace some years ago, as she saw in a clipping among the papers. But if that was so, why did she recall so clearly Harry Protagonist's visit,

their ozological trip into the past and their bungled return? Was it a residual memory that would fade as she resettled into her routine life? But it wasn't *her* life; presumably she was living the life of another Hallie Fowler in another dimension. And yet it seemed the two Hallies were close enough to have overlapping memories.

Poor John! Where was he? On the other hand, poor Hallie! She was as bereft as he.

She wanted to telephone their daughter and son-in-law, and talk to their grandson, but she put it off, not trusting herself to speak coherently.

In the morning she was surprised that she had slept soundly and long. Now she was more puzzled than alarmed by John's disappearance. She was experiencing no grief, possibly because she half expected him to return at any time, or for Harry to walk in and lead her to him.

Or did she accept his disappearance and—disloyal thought—take comfort in it? She telephoned her daughter and in their talk neither mentioned John. There were little discrepancies but she began to feel normal in the person of the other Hallie. Later she recalled John's many crotchets and pettinesses and how often they had irritated her, especially his obsession with words and his nitpicking over their usage, even in casual conversation. She remembered an old hypothetical question—if you could push a button and be unmarried, would you push it? She had always rejected the suggestion but now she begged it in her mind; the answer could have been yes. He had exasperated her so often. Now she was content.

Hallie needed to get out of the house. She took her handbag and headed for the park.

As she neared the pond dark clouds obscured the sun. In the dimness, as through a shimmering curtain, she saw two figures seated at the edge of the pond. One was John. Her heart pounded, with ela-

tion, she thought, then realized it was a kind of dread.

She had begun almost to rejoice in his disappearance but now she had a foreboding that everything would revert to the way it had been. Oh, no, she thought; I was just beginning to be my own person again, after so many years . . .

Then she saw that the other figure was a woman. A stab of jealousy made her stumble but she remembered that she was two Hallies now and that the old one was fading. The new Hallie recovered herself, smiled, and went confidently toward the couple. One other was there—a baby alligator lying half in the pond. It seemed to be a pet.

A strap around John's neck supported a device that reminded Hallie of trays cigarette girls carried in night clubs. It was not as big and was a kind of machine. John's hands rested on it, moving occasionally as over a keyboard. A transistor radio, a jar of peanuts and a half-empty bottle of beer were on the grass beside him.

He looked up and saw Hallie. He frowned, then smiled. The woman regarded Hallie with more than casual interest, her expression one of puzzlement. Now that they were close Hallie could see why; there was a strong resemblance between them. John's companion was another Hallie, but younger.

The older woman thought to turn away but knew she could not. She had to know what had happened to John before she closed the book on him. She apologized for intruding but the other woman said "That's all right, ma'am. You look like the person in the dream my husband was telling me."

John Fowler shook his head and his fingers moved over the keyboard. "No dream," he wrote. The letters came out on a page the width of a miniature book. "Memory fading fast but no dream. Meet the wife."

"His nightmare left him mute," the young Hallie said.

John wrote: "Mute. No spik. Dumb."

"I'm sorry," the older Hallie said, "but I'm glad to see you back safe."

"Likewise," he wrote. Their conversation was brief and awkward—and not just because he had to communicate by machine. She could see that the couple pleased each other and she determined to excuse herself as soon as possible. She asked: "Where is Harry Protagonist?"

John chuckled soundlessly and wrote: "His er-tiamobile done broke down but he's alright. He should be along. Can I convince you to stay and say hello?"

The question mark made it clear to Hallie that he wanted her to go.

"Just tell him I'm fine and thank him for the trip."

"No sweat," John wrote. "Toodle oo."

Hallie looked at him one last time. He wasn't the John she knew but he seemed happier. She nodded to both of them. "Goodbye, John," she said. "You're not so dumb."

Harry Protagonist limped into sight. His clothing was torn and he was far from the dapper figure who had arranged their adventure.

"Sorry to be late," Harry said. "Never got caught in a time storm before."

"Its ok man," John Fowler wrote.

"I'm not myself lately."

"Who is? Listen, things don't always work out like you expect, right?"

"Was that Hallie? The other Hallie, I mean? I'm still not sure who's who."

"She sez no hard feelings."

"Good," Harry Protagonist said. "I wanted to apologize while I still remember what happened. I assume your memory is fading too?"

"Yeah but whos complaining," John wrote. "I'm ok, youre ok, both Hallie's are ok, so whats the beef?"

Still want to write yr book?"

"Not now," Harry said. "I'd be the laughing stock of the academy."

"Write some other book. Rake in the moolah. It can be a million-copy bestseller, a smasher. I know the market. Ill help."

"I don't know. We've all been time-twisted to some extent. I can't quite put my finger on it—"

"Makes no never mind pal. With the story you got to tell and my comand of the langwidge—"

"That's it," Harry Protagonist said. "I sense a difference in the way you express yourself. I believe you once had a more felicitous way of phrasing things, that certain neologisms and colloquial expressions have crept into your vocabulary."

"Heavy, man! Listen, the times they are a changin. What matters is that we got a hot property in yr book and that I kno where the bucks are."

"Well, if you say so."

"No sweat," John said. "Trussed me."

Harry Protagonist looked dubious, then shrugged. The important thing was to recoup his fortunes in another field until the time travel business behaved the way it was supposed to.

John beckoned the young Hallie over. He gave her a kiss and wrote: "Get lost for a whole, sweetheart. Me and Kid Harry got a job to do." She nodded brightly and went away.

Harry Protagonist replaced her at his side. "You're sure you can do it?"

"Trussed me," John Fowler wrote again. He threw a peanut to the alligator and winked at it.

"Your mascot?"

"My pal. Always did like the critters." He switched on the radio. The latter-day Engelbert Humperdinck was singing his latest hit.

"Another station, maybe," Harry Protagonist suggested.

But John Fowler turned the volume to full. He mouthed the words happily along with Humperdinck II. He tapped the keys:

"MOBY-DICK; or, The Whale, by Harry Protagonist."

Even to Harry that seemed a bit much. He protested. "Listen, John—"

"Sure-fire title," he tapped. "Like whats-her-name said, I aint so dumb."

Harry was an authority on scam artists but he could only goggle in admiration at this one. Feebly he repeated: "John—" Then he sat to watch him work.

John Fowler swigged down the last of the beer and tossed the bottle into the pond. When the ripples subsided Harry could read the label clearly.

"Now the most important part," John Fowler tapped. "Gotta grab 'em in the opening line." He wrote: "Call me Jack."

—Richard Wilson



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ON BOOKS



by Norman Spinrad

About halfway through **THE SNOW QUEEN** by Joan D. Vinge (Dial), I had a significant satori—I understand at last the true difference between “science fiction” and “science fantasy”—and that was when what had been an enjoyable reading experience began to go sour for me.

THE SNOW QUEEN is self-admittedly “science fantasy.” The title itself, with its homage to the famous fairy tale is an announcement of that intent, as is the traditionally mammoth 500 pages plus length. The major setting is the planet Tiamat, somewhere and somewhen after the collapse of the great lamented stellar Empire, where Arienrhod, the Snow Queen of the title, is the immortal (or nearly) more or less absolute monarch, ruling from the ancient seat of Winter power in Carbuncle, until astrophysical events change the planet’s climate, replace the generations-long Winter with an equally long Summer, and “close the Stargate,” which is to say prevent the use of the nearby black hole as an FTL portal by the offworlders of the Hegemony, the local multi-planet successor state to the long-vanished Empire.

Other major characters include Moon, a “sibyl,” and secretly a clone of Arienrhod; her childhood lover among the “anti-tech” Summers, Sparks, who later becomes the cynical, embittered, official offworlder lover, or “Starbuck” of the Snow Queen; and Jerusha and Gundhalinu, female and male offworlder cops.

Traditionally, when Summer replaces Winter as the Stargate closes, the offworlders split for home, removing their higher technology, the Summer Queen takes over, the technological level drops, and the Snow Queen and her Starbuck are ceremonially sacrificed to mark this cultural and cyclical rite de

passage. Basically, the story of the novel revolves about Arienrhod's various attempts to circumvent this cycle, extend the reign of Winter beyond the closing of the Stargate, and thus preserve the Hegemonic-level culture against the return of the primitivistic Summer half of the eternal cycle.

The only hint of "magic" is the mystical trance-state achieved by the sibyls in response to questions in which they speak all sorts of arcane knowledge, and not too far into the book, this is revealed as a connection to some ancient galaxy-spanning computer information net left over from the old higher civilization of the vanished Empire.

So what makes THE SNOW QUEEN science fantasy and not science fiction?

Well on a surface level, as in almost all works of this genre, we have an interstellar technology cohabiting with a medieval type social and political structure. Tiamat is deliberately kept in an underdeveloped state by the Hegemony, and what high technology it does have is the equivalent of beads handed out to the natives by traders, so this much is well-justified and plausible, but the planets of the Hegemony with their FTL ships, orbiting cities, and etc. are also enmeshed in a hierarchical, formalized, caste-ridden social and political system, and this of course is bunk.

Admittedly it is precisely the kind of bunk that defines "science fantasy," and, all other qualities of the work being top-drawer, we accept this as a necessary convention of the genre for the sake of the story, ala DUNE, for example. That's why it is "science *fantasy*." In "science fiction," with its thematic concentration on the relationships between technology and culture, the high tech-anachronistic culture relationship would be rejected as totally illogical, but in

“science fantasy,” we accept it as given.

The trouble with *THE SNOW QUEEN* is that here this dichotomy is not merely conventionalized setting but the very McGuffin of the story; at the core of the novel is a scientific absurdity which cuts to the very heart of the usually ignorable implausibility of the science fantasy genre.

The offworlders keep Tiamat in its technologically primitive state so that they can continue to trade their high-tech goods for an elixir of immortality produced nowhere else. The elixir is a genetically-engineered virus which grows only in the blood of the “mers,” an aquatic species artificially created on Tiamat by the lost Empire. When the Stargate closes, the supply is cut off, and immortality for the rich and powerful few is lost until Winter once more replaces Summer on Tiamat. The mers, who turn out to be sentient and saintly, are mercilessly slaughtered for their blood, and this genocidal enormity is the thematic core of the book, from whence radiates the evil and corruption of Carbuncle, Arienrhod, Winter, and the offworlders.

From whence also radiates, alas, the skein of implausibility which at least for me ends up destroying what is otherwise a well-written and complexly realized work.

Consider: the Empire created the mers as host species for the immortality virus which they also created. If they could create the virus and the mers, why couldn't they tailor the virus directly for the human metabolism? Consider: the Hegemony causes the mers to be hunted to the verge of extinction for their blood, and they lose access to it anyway during the generations-long Tiamat Summer. Why can't a technology capable of FTL culture the virus in vitro? Failing that, why do they *kill* the golden geese instead of breeding and bleeding them in captivity? Maybe they haven't reinvented genetic engineering, but

surely they have reinvented the zoo and the aquarium?

Alas, the only answer is that Vinge needed the hunting of the mers, the loss of the immortality elixer, and etc. in order to be able to write **THE SNOW QUEEN** in the first place. It is not merely a flaw marring the perfection of the novel, it is the flaw upon which the whole novel is based. From her other work, one can guess that Vinge is no scientific ignoramus, and indeed this is not mere ignorance of a scientific detail, but of the fundamentals of how science works. A gaping logical hole of which she must have been aware. My guess is that she knew this and deliberately decided to fudge it for the sake of the plot.

If such fudging is a one-time peripheral gambit, a skillful writer like Vinge can get away with it, but here it is a central and early decision which infects the whole book and finally ends up pointing to the hand of the artist blatantly manipulating the characters and scenery, destroying the fragile illusion of fictional reality by noisily revealing the creakings of the plot skeleton beneath the literary flesh. Thus, for example, we have the main viewpoint characters forever crossing and recrossing each other's paths through the plot in a highly improbable manner which goes far beyond the reasonable limits of the use of coincidence. Thus we have a somewhat jarring confusion between the varying dialects in which the viewpoint characters think (very well done on the whole) and sections of direct author-exposition which sometimes combine them in a melange which makes it difficult to tell whether we are being given information from the point of view of one character, another, or Vinge herself, who maintains no consistent "voice" in these non-viewpoint sections.

THE SNOW QUEEN is a big book, it will probably be a very popular book, it shows considerable talent, it is well-crafted in many ways, but it is not so much a

good book with flaws as a book built upon one big central flaw, and no amount of talent can overcome this flaw of initial conception, this deliberate fudging not of fact but of logic which is the principle vice that the caveat "science fantasy" so often cloaks.

Not that actual "science fiction" cannot suffer from this species of logical flaw as well—case in point, Kate Wilhelm's well-regarded JUNIPER TIME (Harper & Row, Pocket Books).

Kate Wilhelm is one of the finest stylists in the field. Everything she writes, including JUNIPER TIME, has characterological depth, gritty verisimilitude of setting, sense multiplexity of mood and reality, and a sense of hard-edged, ruthless emotional logic and nuts-and-bolts believability that is at the opposite pole from "science fantasy." Page by page, chapter by chapter, line by line, Wilhelm is one of the premiere "realists" working the extended sf genre.

On this level, JUNIPER TIME is no exception. Wilhelm paints a picture of the US under a horrid drought that has squeezed the western population fleeing from it into the east with the full spectrum of the realist's palette, going Michener's GRAPES OF WRATH one better at its own game, and she is at least as good as say Castenada in rendering the reality of the Indian culture rebirthing itself in the desert, and even the world of the space station that her main male protagonist is involved in is as real as real can be. If a bit slow moving some of the time, JUNIPER TIME carries you along and sucks you in, line by line, page by page, chapter by chapter, as linguist Jean Brighton returns to the depopulated Oregon of her childhood and merges her consciousness into the renaissant Indian matrix, as her childhood friend, Arthur Cluny crusades for a return to the space station where his astronaut father died mysteriously, as what appears to be an alien message capsule is found in space, as Arthur seeks out Jean to decode it, as a

paranoid government apparatus battles over whether releasing this news would be a blessing or a curse

Only one thing ate at me a little all the way through and that was the picture that Wilhelm painted of the US government and its minions acting like evil paranoid assholes under pressure all the way through. Now I will be the first to admit that in the not-too-distant past the Nixon Administration was every bit as venal, corrupt, incompetant and paranoid as the Administration Wilhelm depicts, but after all Nixon and Co. as literary characters would be too cartoonish for verisimilitude, indeed few people believed the reality of what was going on until they had their faces well-rubbed in it. It struck me that Wilhelm was being a bit shrill about this, a bit ideological, and this was a little jarring even though I don't necessarily dislike passionately political fiction because the rest of the novel was so cool and multifaceted and complexly realistic.

Now a certain past reviewer in this journal used to announce that he was about to give away the ending in bold letters, which of course tempted you to look. I am not about to do that; I consider it a critical sin. Trouble is I can hardly review JUNIPER TIME without mentioning the ending schtick because the ending schtick here is precisely what is wrong with the book. All I can honestly say is that if I gave the ending away you'd scream "Oh no, not that one!" and never read the book, and then you'd miss an interesting experience indeed, which doesn't become unsatisfying until right at the end, when it is revealed that all this art, realism, complexity, and plot is built around a McGuffin straight from an old *Outer Limits* starring Robert Culp, and at least one previous B-movie, something that was a groaner of a cliché before 1960.

Without giving it away further, I have to point out that the McGuffin is silly in the same way that

Wilhelm's portrait of the American political structure turning into toads in the face of existential challenge is cartoony and unrealistic by the terms of the depth and complexity with which she renders everything else. In the real world, even the faceless villains of a police state bureaucracy have inner life and in the real world people in pivotal or important positions simply don't play games as one-dimensional and silly as the plot the dead astronauts concocted here. Everything Wilhelm has written including about 90% of *JUNIPER TIME* declares that she knows this. She's such a good writer that here the logical flaw and central absurdity *doesn't* infect the whole book; I enjoyed it up until the final, dramatic plot twist, until the last veil of illusion was flipped away to reveal the comic book schtick at the heart of this complexly realized realistic novel.

Suzy McKee Charnas' *THE VAMPIRE TAPESTRY*, (Simon & Schuster) on the other hand, takes what was the central flaw in *JUNIPER TIME*, turns it inside out, and makes it into great strength indeed.

Here the cliché schtick is revealed as early as the title itself, which tells you that, yes, this is another modern day vampire novel. A contemporary fantasy novel by definition, right?

Wrong.

Weyland, the vampire of this tapestry, is a man or creature who needs to suck human blood to sustain himself. He knows he has lived centuries, but back beyond his present incarnation, his memory is vague. He is a loner, a proud predator, who considers humans "cattle" and who yet has never met another of his own kind, indeed irrationally believes that he is *suigeneris*. He doesn't turn into a bat, his bite does not infect victims with vampirism and often doesn't kill them, he fears neither cross nor mirror, and functions quite well in the day time world as a tenured professor. When he finds himself infected with sym-

pathy for "cattle," he goes to a shrink. He loves fancy flashy cars and fast driving. Although he would strenuously deny it, he is probably the most "human" vampire in fiction.

Which is why, in a way, **THE VAMPIRE TAPESTRY** is esthetically more science fiction than fantasy. Weyland, the vampire, is the only element in the book at variance with the realistically rendered "real world"; he is the science fictional speculative element, the given, neither explained nor supernatural. From there Charnas goes on to render the inner reality of such a creature and the interpersonal relationships between him and various other viewpoint characters, including a South African academic widow, a strange fanlike teenager, and a New York psychiatrist.

Thematically, what the novel is about is the question of empathy between predator and prey, whether Weyland will become "humanized," whether this is a survival value or not from his point of view. It is not about spooky old houses, modern day vampire killers, or even the mystery of Weyland's origin. It is a psychologically realistic science fiction novel about a realistically rendered sort of vampire, perhaps unique of its kind as he is of his, and very well done indeed. Formally, it is a series of novella-like chapters from various viewpoints, including, climactically, Weyland's own; whether it was conceived as a unified novel or a series of novellas is beside the point for once. It is the "tapestry" that it says it is, and it works.

David J. Skal's first novel **SCAVENGERS** (Pocket Books) is also a science fiction novel about a kind of modern vampirism, is focused on characterological depths almost savagely, and in a way I don't even think I can explain may be a kind of early suffusing of "punk" or "New Wave" esthetic into science fiction, perhaps not so much influenced by the music but, like the music, by the times.

Skal takes the old cliché that "you are what you eat," replaces the "what" with "who," and creates a kind of ultimate psychic vampirism in the form of an ultimate sort of "drug trip." The sf McGuffin here is the notion that memory is personality and both are chemically coded in the brain, so that by the proper biochemical magic, you can prepare an extract from a human brain, shoot yourself up with it, and "become" the person whose brain you have cannibalized.

In Skal's decayed near-future urban setting, "brainsuckers" are the junkie punks who shoot up human brain extracts for kicks, to transcend their own limited personalities, to merge in a kind of transpersonal ur-mind. There is a thriving illicit trade in human brains, particularly the brains of artists and creative people, who after all figure to give the best highs. Kelly is a kind of female Andy Warhol who keeps creeps like these around her and has shot up the brains of fellow creators from time to time, Brian is her one-time lover who hates the whole scene and is driven mad when Kelly's brain is scooped out, processed into a few dozen doses, and starts turning up on the market, and Tracy is one of the brainsuckers he picks up to shoot up with Kelly from doses of her that he's secured.

The novel focused on these three characters as Tracy and Kelly fight it out inside Tracy's head, held captive in Brian's sleazy loft-fortress dump, formerly the salon of Kelly. It is a hermetic, paranoid, compacted novel, mirroring in miniature the anomie and savagery of the decayed social context in which it takes place. The focus is on the three main characters, the canvas is small, but the intensity and ruthlessness of the novel is tremendous. There is something of early William Burroughs here, more than a little of vintage Philip K. Dick, a whiff of the Essex House novels of Michael Perkins and David Meltzer, and a kind of Lou Reed esthetic.

Not your great big blockbuster science fantasy debut novel but a work that seems to have a lot of some kind of writing experience behind it, written with a style, intensity, and sheer nastiness seldom encountered in the sf genre.

Orson Scott Card, on the other hand, broke into the field with a series of blockbusters which were paid for as such before they were published, and who now seems to have encountered a lot of negative vibes for his instant fame, partially because his books have not been up to the hype, partially because people envy the early fast big money he has made, and partially due to various conspiracy theories.

Be that as it may, Card is neither the instant next Heinlein nor a hollow fraud whose work is empty. Case in point, **SONGMASTER** (Quantum). The commercial conception is there: the first section of the book is adapted from "Mikal's Songbird," an *Analog* novella that came close to some awards, and the rest of the book could be seen as a novella sequence set in the same universe.

Anset is a "Songbird," a kind of supersinger, a chemical juvenile castrati trained and created by the Songhouse on the planet Tew, a mystical singing order something like a Buddhist monastery, which dispenses Songbirds only to the worthy, those whose spirit is high enough to be truly appreciative of their mystical powers of song. Mikal is the Emperor of the galaxy for all practical purposes, who eventually is given Anset, the greatest Songbird ever encountered. Mikal dies at the end of the first section and we follow Anset from boyhood in the Palace on Earth, through his young manhood as governor of Earth, his maturity as gray eminence behind Mikal's successor, who he burns out with his song, his final career as Emperor himself, and his return to the Songhouse as a kind of penitent monk.

There are several flaws in **SONGMASTER**, some of

which seem typical of Card's work to date. A minor one is the continual use of names like Anset, Nniv, Rruk, Hrrai, and so on, which are impronounceable as written, have no "feel" to them, and in general tend to impart an air of unreality to the proceedings by pointing to themselves as science fictional gobbledegook. More seriously, this air of sloppy unreality tends to spread to the background of the book, which, among other things, asks us to swallow Mikal's cakewalk conquest of the galaxy with a few perfunctory paragraphs, handles changes in time and space scale from Earth to the galactic planets by not handling it at all, and shows one man conquering a whole planet or two simply by giving Emperor's orders which are not disobeyed. The seams between the sections show too, because there is no consistent pattern of time span; some describe years of development at length and in depth, others breeze over decades with a little overt author exposition, and even the time-breaks between sections vary formlessly.

Finally, Card has presented himself with a bitch of an esthetic problem which he really doesn't solve. The core of the book is the tremendous emotional, psychological, and esthetic impact that Anset's songs have on people. They can melt the hearts of tyrants, drive men mad, show people their own inner being, even control their actions.

So how does Card manage to give the reader the experience of hearing these songs through the medium of prose?

He doesn't. He doesn't even try. Instead, he contents himself with describing the reactions of characters hearing the songs; you must take that they can do what they do on faith.

Now maybe discretion is the better part of valor here, maybe Card was facing up wisely to his own present limitations, indeed it may not even be possible to translate a mystic musical experience into

prose. Inarguably, to succeed in doing so would be to create a true masterpiece, which is not what SONGMASTER is. But I'm not sure that Card isn't capable of writing one.

Because having pointed out the flaws in SONGMASTER, I would not want to leave the impression that this is a bad book, or even the impression that it is not a good one.

Orson Scott Card has several things going for him. For one thing, he can be coldly and suddenly disgusting. Violence and gore, clinically described can suddenly erupt into the more usual science fictional stage set. Card does this well, does it sparingly, and does it to telling purpose, making his novelistic reality by definition multileveled, and therefore decidedly unhacklike. Most of the time, his universe just rolls along on the surface, but every once in a while something erupts from the depths. And life itself is like that.

Then too Card is developmental. Anset goes from tiny tyke to grizzled ancient and while the episodic form makes this a bit jerky and uneven, Card really does successfully portray growing up and aging in a character whose development is certainly not conventional and whose psyche is by no means always sympathetic.

SONGMASTER, far from being either a piece of blockbuster sf bestseller magnificence or an overpraised and overhyped new writer falling on his face, is an interesting, promising, somewhat sloppy, ambitious but perhaps not ambitious enough novel whose greatest flaws seem to be those of amateurism, inexperience, and formal structure, and whose considerable virtues lie in directions which do indeed point to the possibility of a major talent in the early process of emergence.

—Norman Spinrad



The Automatic Rifleman

by David Drake



**Weapons are merely tools;
it is men who are dangerous....**

Coster was waiting for them in the darkened room, hidden by the greater shadow of the couch. His face was as lean and hard-edged as the automatic rifle he held pointed at the door.

"Where's the goddam light?" Penske muttered. He found the switch, threw it, and froze with his hand halfway down to the knife in his boot.

Davidson bumped into Penske from behind and cursed, her lips twisting into the sneer she kept ready when she was around the short man. "Move your—" she began before she saw why Penske had stopped. Then, without hesitation, she cried, "George, look out!"

"Too late," said Coster with a bailiff's smirk and the least motion of the rifle muzzle to bring it to the attention of George Kerr. The black man in suit and tie loomed behind his two companions. His eyes were open and apparently guileless, shuttering a mind that had already realized that the flimsy apartment walls would be no obstacle to rifle bullets. "But we're all friends here," Coster went on, his grin broadening.

"Then I suggest we all come in and discuss matters," said Kerr in a cultured voice, showing his bad front tooth as he spoke. His fingers touched Davidson's right elbow and halted the stealthy motion of her hand toward her open purse.

"Sure," said Coster, nodding, "but stay bunched in that corner, if you will." His head and not the rifle twitched a direction. "Until you're convinced of my good intentions, you'll be tempted to—put yourselves in danger. We don't want that."

"Who the hell are you?" Penske demanded, shuffling sideways as directed. An angry flush turned his

face almost as dark as that of Kerr beside him.

"My name's Coster," the rifleman said. "Agfield told me where I'd find you."

Davidson whirled angrily toward Kerr. "I told you not to trust that bastard!" she said. "Somebody ought to take one of his basketballs and stuff it—"

"Dee, that's enough," the big man said, his eyes still on the rifleman. He had closed the hall door softly behind him. Nothing in his manner called attention to the pistol holstered in the small of his back.

"He said you could use a rifleman for what you had in mind," Coster amplified. "We're what you need."

"We?" asked Penske tautly. The muscles beneath his leather jacket were as rigid as the bones to which they were anchored, for he recognized even better than the others the menace of the weapon which covered them.

"Me," said Coster, "and him." His left forefinger tapped the gunbarrel where it projected from its wooden shroud. His right hand stayed firm on the rifle's angled handgrip, finger ready on the trigger.

Calmly, Kerr said, "Agfield doesn't know what we have in mind." His right hand was now loose at his side, no longer restraining Davidson.

"Sure he does," said the rifleman, flashing his tight-lipped grin again. "Kawanishi, the Japanese Prime Minister. And I'm here to make sure you get him."

For a moment, no one even breathed. Coster leaned forward, his right elbow still gripping the gunstock to his ribs. He said earnestly, "Look, if I were the police, would I be talking to you? The whole World Proletarian Caucus is right here, right in front of . . . us. And if it was trials, convictions, they were after—the evidence is *on* you, or at least outside in your car. You blew away a teller in La Prensa, and you've still got the gun, don't you? And the one that killed that little girl in Mason City?"

Davidson mumbled a curse and looked hot-eyed at Penske.

"But we're friends," Coster repeated. Very deliberately, he rotated the automatic rifle so that its muzzle brake pointed at the ceiling. The rubber butt rested on his thigh.

"Friends," said Kerr. "Then we should get comfortable." He took off his suit coat and turned, as deliberate as Coster, to drape it over the back of a chair. The grip of the big Colt was a square black silhouette against his light shirt.

Everyone eased a little. Coster laid the rifle across his knees, one hand still caressing the receiver of the weapon. Davidson and Penske both lit cigarettes, the latter by flicking the head of a kitchen match with his thumbnail. He tossed the wooden sliver toward a wastebasket. It missed, but he ignored it as it continued to smoulder on the cheap carpet.

Kerr took one of the straight chairs from the kitchen-dinette and sat backwards on it, facing in toward the living room and Coster. The pistol did not gouge at him that way. "Penske, why don't you bring things in from the van," he said.

The short man glowered, but his expression suddenly cleared and he walked to the door. "I'll knock when I want you to open," he said as he left the room.

Davidson moved over beside Kerr, her fingertips brushing the point of his shoulder. "You sound very confident about your ability to use that gun," the big man said with a gesture toward the oddly-shaped rifle. "But I don't know that I'd care to make plans based on something . . . suppositious."

Coster's tongue clicked in amusement. "Do you want references? Somebody who saw us put away Kennedy? Or King?"

Davidson snorted a puff of smoke. "You don't look like a fool," Kerr said.

"I'm not—not any longer," the rifleman replied. He

shook his head as if to clear something from his hair. He went on, "What we've done doesn't matter. You won't believe me, and it doesn't matter. But if you have some place for a demonstration, we'll—demonstrate."

Kerr nodded. "That would be best," he said neutrally.

Coster suddenly turned and lowered the rifle again toward the door. "Speaking of fools," he said, "your Mr. Penske—"

There was no knock. The door slammed back. "All right you—" Penske shouted before he realized that the fat muzzle of the automatic rifle was centered on his breastbone. The swarthy man held a carbine waist high, his left hand locked on the curving 30-round magazine.

Obviously furious but with no more sound than his chair made clattering on the floor, Kerr strode toward the disconcerted Penske. With his left hand the black gripped the carbine and tugged the smaller man back within the room. Then his right hand slapped Penske's head against the wall. He stepped away, holding the carbine muzzle-down. "And if you'd used it, you damned fool?" the big man demanded. "If you'd brought the police down on us here, what chance would our plans have had then? *What chance?*"

"You didn't have to hit me," Penske said, not quite meeting Kerr's eyes.

Contemptuously, the black unloaded the carbine, tossing the magazine onto a stuffed chair and ejecting the round in the chamber. It winked against the carpet. "Get the things out of the van," he said.

Kerr had rented the furnished apartment a month before, but that was as far as preparations had gone. The can-opener beside the sink was broken and Penske, grumbling, had to hack their dinners open

with his heavy-bladed dagger.

"If you were a real Green Beret, you could bite the lids off," Davidson gibed.

"Shut the hell up!" the short man snarled. He caught Coster eying him as the rifleman spread baked beans one-handed on a slice of bread. "I'd a' made it, no goddam doubt," Penske said defensively. "Only they had us doing sprints up and down the company street with sand in our packs. Some wise-ass clerk thinks it's funny to laugh at me. I knocked his teeth out, and the bastard's goddam lucky they hadn't issued us ammo. But the goddam government don't want anybody that'll really fight, so they busted me out."

"Makes a good story," Davidson said. "I think they caught him with his—"

"Dee!" Kerr said.

Penske's eyes unglazed and he slowly lowered his knife back onto the can of spaghetti. He hammered the hilt down with his palm, splashing the red sauce onto the table.

Despite their hostility, Davidson and Penske settled down to a desultory game of cribbage after dinner. Kerr sat in the living room across from the rifleman. "I don't play games that you have to score," the big black said. "When I win, the whole world will know it. When I win, there won't be any polite Orientals pumping mercury into the sea because poisoning children is cheaper than not. There won't be any blue-shirted gestapo beating in their brothers' heads because the bankers say to. There won't be any more nuclear powerplants pouring out their deadliness for a quarter million years."

The rifleman smiled. He held a jelly glass he had filled with whiskey and had not diluted. "There won't be any three-year-olds orphaned in La Prensa because their daddy was too slow emptying his money drawer."

"What are you here for?" Kerr demanded.

Coster's free hand played with his rifle. "Now? To kill a Japanese politician in America discussing import quotas." He swigged his drink.

Kerr leaned forward. "To show the rich that there is justice for the people?" he pressed.

"Human society's a funny thing," said the rifleman, staring at the reflection of the overhead light in his whiskey. "Very complex. But if it gets enough little thrusts, all in the same direction . . . lots of people hate lots of other people anyway. Someday enough people are going to hate enough other people that one of them is going to push the button. Then it all stops."

Kerr's lips tightened. "Bad as things are, I don't believe they've come to that pass yet. Nobody would gain by that."

"Right. Nobody would gain."

Penske and Davidson were arguing about the count. The dinette was blurry with cigarette smoke. Kerr stared for a moment at the ex-soldier, then said to Coster, "There'll be bodyguards, you know. Secret Service men."

"Bodyguards," Coster snorted. "Like Huey Long had? It was one of his guards who killed him, you know, a bullet ricocheting in the marble hallway. And when King Alexander was killed in Marseilles, the gunman ran right through a line of mounted gendarmes."

"I suppose you shot him, too?" Kerr said acidly. "Like Kennedy?"

Coster looked at the heavier man with an odd expression. "I wasn't there," he said. "That was in 1934. The man who did it used a pistol, yes, but there was an automatic rifle backing him up. If it had been needed." He finished his drink with a long swallow and said, "A push here, a push there"

Kerr stood abruptly. "It's been a long day for us,"

he said. "Now that I've stopped seeing pavement, I'll go to bed. You can carry your things into the smaller bedroom, Coster. Penske fits the couch better, I think."

Coster nodded. "I don't have much," he said, toeing a canvas AWOL bag.

In the dinette, Davidson threw in her hand without a word. She followed Kerr into the larger bedroom, slamming the door behind them.

The rifleman walked over to the table, his weapon muzzle-down in his left hand. He poured a drink and raised it in an ironic salute. "Cheers," he said to the brooding Penske. He drank and walked into the remaining bedroom without bothering to take his bag.

Penske drove with Davidson on the front seat beside him. Her short hair was dark except at the roots where it was growing in blond. Kerr and Coster looked at each other from side benches in the windowless back of the van.

Over his shoulder Penske said, "Ah, George . . . the guy who owns the farm, Jesse, I met him when I was at Bragg, see? Could be he won't be around and he's not gonna care what we're shooting, choppers, grenades, whatever. Only maybe you better stay in the back, you know? It'd be better if Jesse didn't, you know"

"Jesse doesn't like his black brothers, is that it?" Kerr said easily. His face worked and he added, "Don't have much use fer a nigger 'cept to kick his black butt, that is."

"Well, George" the short man mumbled. "We just needed a place to range in the guns"

"That's all right, it's no fault of yours," Kerr said. "Or your friend's." He looked over at the rifleman. "You see what they do, splitting natural allies so that they'd rather tear each other's throats out than both tear at their oppressors. Turning humans into

beasts."

"Humans are beasts, of course," Coster said without emphasis. "Whether or not Darwin was right, he was convincing on that score. I think that's why the concept of werebeasts is so much less terrifying today than it was in the Fifteenth Century. We're all basically convinced that man-beasts are normal reality. Hieronymous Bosch and his constructs of part flesh, part metal . . . that I don't think we've outgrown. Yet."

"Is that all injustice means to you?" Davidson asked sharply. "That we're all beasts, so what? Did you just get out of your flying saucer or something?"

Coster looked at her, his fingers toying with the selector switch below his rifle's gunsight. "Viewpoint, I suppose," he said. "But no, I'm human. Funny, I used to wonder what aliens . . . creatures from space, that is . . . would look like. I thought they might look just like you and me." He began to laugh brittlely.

No one in the van spoke again during the remainder of the drive.

After nearly an hour on the road, Penske pulled off on a farm track. A gate stopped the van immediately. The swarthy man jumped down, unhooked the chain, and tugged the sagging frame out of the way. As he got back in and slipped the van into gear, he explained, "Jesse said he'd loop it for me, not run it through the bars."

Penske pulled up just beyond the arc of the gate. He said to Davidson, "Go hook it shut. We don't want any a' the cows to get loose."

Davidson's eyes narrowed. "You opened it, you can shut it. Who the hell—"

"Look, bitch!" Penske said, his right hand curled by reflex into a fist, "You'll shake a leg or you'll—"

"Penske!" Kerr shouted, thrusting his torso over the seat and forcing the driver back without contact.

"What do you think we are, exploiters ourselves who treat women like furniture? Want to try that with me too, is that what you think?"

"George, I . . .," Penske began. He shook his head fiercely to hide the tears of frustration. Then he unlatched the door, almost falling out backwards in the process. He closed the gate. It was almost a minute before the short man got back into the van and drove on. There were three more gates in the long track between the highway and the pasture swale in which they finally halted. Penske opened and closed each gate himself without saying anything more.

In wet weather the swale drained into a creek more than three hundred yards from the van. The bank beyond the watercourse was steep but generally grassy. There was a bare patch in line with the axis of the swale. Bits of cardboard and metal there brightened the bullet-gouged bank. Other target material lay in riddled clumps at various distances along the way. There was some scattered cartridge brass, mostly .22 caliber—centerfire empties had been picked up for reloading.

"The boys around here use it a lot," Penske said in satisfaction as he took cases out of the back of the van.

"The boys," Davidson snorted. "The Klan's more like it."

Penske looked at her without speaking or moving. He had just begun to load a magazine into a carbine. He looked back downrange after a moment.

Davidson swallowed, then bit at a knuckle. "I'll set some targets up," she said.

"That'll take rigging," Penske said without turning around. "You get the rest a' the guns loaded. Coster'n me'll rig the targets."

"Sure," she said, and she slid a box of miscellaneous empty containers over to the automatic rifleman.

Coster gripped the box with his left hand and his jutting hip bone. His other hand held the rifle at its

balance. "All right," he said, "where do you want them?"

"I doubt you'll have to fight off the field mice," Kerr observed from the van. "You can leave the gun here and save the trouble of carrying it."

"No trouble," Coster said. He began walking down the swale.

Penske, carrying an armload of clothesline and plastic milk jugs, trotted along beside the rifleman. "You put a few a' those at one hundred and two hundred," he said. "Save a lot for the bank across the creek, though, 'cause that's where it's really gonna be at. We'll see if you can handle that thing'r not."

The smaller man stopped some fifty yards from the van. He dropped his load and pointed. A fence post and a metal engineer stake stood on opposite rims of the swale. "I'm gonna rig a moving target," he said. "You set up the bottles."

Both men worked quickly. By the time Coster had returned to the line of the posts, the shorter man joined him unreeling clothesline behind him. "Aw right," Penske said, wringing his hands with enthusiasm as they strode back to the firing line. "Aw right, now we just see how goddam good you are."

Coster said nothing.

On a blanket beside the van, Davidson had laid out half a dozen varied long arms. Kerr was still in the vehicle, either in deference to Penske's request or from a disinclination to be anywhere else. Penske had forgotten his shirt downrange. Sweat streaks trembled along valleys separating ridges of chest muscle. He picked up what looked like an ordinary autoloading rifle and checked its magazine before cradling the weapon in his left arm.

"We let the lady shoot, hey?" Penske said to Coster with a high-lipped grin. "Then you'n me try it."

The automatic rifleman shrugged.

Davidson passed Penske's reference with only a

scowl. She picked up an M1 carbine and pointed it in the general direction of the nearest bottles. Her grip on the trim little weapon was fierce enough to whiten the skin across the tendons of her hands. She held the gunstock a good quarter inch from her shoulder. The first shot was loud and metallic, startling even to those who were prepared for it.

"You don't wanna let it scare you," Penske said, reaching for the carbine.

"Go shove your head up your ass!" Davidson flared, snatching the weapon away with a clear willingness to empty it into the swarthy man. She whirled back to the targets and fired a long, savage volley as fast as she could jerk her trigger finger. When she paused, the muzzle had recoiled up to a 30° angle. None of the men spoke when she glared around fiercely. Squinting along the barrel, Davidson resumed fire more deliberately until the banana magazine was empty. Her brass spun off in flat arcs to the right. Once a puff of dirt halfway to the targets marked a shot. Davidson flung the carbine back onto the blanket and stalked into the van.

Penske started to say something but thought better of it. He grinned at Coster and raised his own rifle. Instead of a shot, there was a ripping five-round burst, the rifle emptying its own magazine as Penske held the trigger back. Dirt spouted around the bottles, though the last three shots had been slung skyward by the recoiling muzzle.

"Thought you had the only automatic rifle here, huh?" the short man crowed. "Converted this myself, same as the one a' the M1s and the .22 there. Not so special now, are you?"

"You only hit one bottle," Coster said. His left hand curled around the grip on the rifle's forearm.

"Only one?" Penske cried in a fury. "A man's a lot bigger target'n a goddam bottle!"

Metal clicked as Coster's forefinger slid forward the



safety catch in his rifle's trigger guard. Speech crumbled into the shattering muzzle blasts of the automatic rifle.

Coster ignored the nearest targets. The bottles at 200, then 300, yards disintegrated in pluming earth. The weapon fired in short bursts of two and three rounds, the muzzle recovering momentarily between blasts to snuffle another target. When the bolt locked back on an empty magazine, there was nothing but dust and glass shards at either aiming point.

Coster's fingers relaxed on the handgrips. He extracted the magazine and began thumbing cartridges into it from a box on the ground. He looked sidelong at Penske.

"We'll try the moving one, wise guy," the shorter man said.

Behind them, Kerr had gotten out of the van. "What kind of gun is that?" he asked.

"M14E2," Penske replied. "The squad automatic

version of the standard M14. Has pistolgrips and a straight-line stock. Made goddam few of 'em, too, before they switched from the fourteen to the sixteen." He looked at Coster. "Hey, ain't that so?"

Coster shrugged and locked home his magazine. Heat waves danced from the tip of the barrel where metal was exposed to the air.

"Well, don't you even goddam know?" Penske demanded. "How'd you get that rifle, anyway?"

The rifleman looked at him. "You'd better hope you never learn," he said. "Now, are we going to shoot guns or talk about them?"

"We'll shoot," the smaller man said fiercely. "We'll goddam shoot." He pointed to the gallon milk jug suspended beside the engineer stake. "One line's through the handle, the other's tied to it," he said. "When I pull this one—" he gestured with the loop of wire-core clothesline in his left hand—"the jug runs to the other post. Don't sweat, I poured it full a' dirt so it'll show if you hit it. *If* you hit it."

"Then pull," Coster said and braced himself. His knuckles were as white as Davidson's had been. His head, hunched low, looked more like that of a man trying to hide than one aiming.

Penske chuckled. "Won't hit nothing but air if you're that scared a' your weapon," he said. He tugged two-handed at the line bent around the fencepost. The jug spurted sideways and the first three bullets ripped it. Sandy loam sprayed from the torn plastic in all directions. The impacts spun the jug around its support line and the second burst caught it at the tip of its arc. Dirt flew again and both lines parted. The gun muzzle tracked the flying container, spiked it in the air, and then followed it down the swale, the bullets themselves kicking their target into a semblance of life.

Flying brass had driven Kerr back from where he stood to Coster's right. Now he massaged his left fist

with his right palm, watching the rifleman reload methodically.

"That enough?" Coster asked. Kerr nodded.

Penske had silently begun to gather up the paraphernalia they had brought. Suddenly he stopped, staring at the empty cartridge box he held in his hand. "You reloaded from this," he said, waving the box in Coster's face. "Last time."

"So?" said the rifleman. "You want me to pay you for them?"

"You stupid bastard!" the shorter man blazed. "This was .30-'06 for my Remington there. It won't fit a goddam M14. You need .308!"

"Then I didn't use your ammunition after all," Coster said, backing a step. "I brought my own in my kit, you know." His foot tapped the AWOL bag gently.

"Let's see that goddam rifle," said Penske, lunging forward, and the safety clicked off with the muzzle only six inches from the bridge of his nose.

"Don't," said Coster very quietly.

Sullenly, the ex-soldier backed away. "Somebody gimme a hand with this crap," he said, thrusting weapons back into their cases.

"We aren't rivals, you know," Coster said without lowering the M14. "I wasn't Oswald's rival either. If you want a man dead and he dies, what else matters?"

"Just shut the hell up, will you?" Davidson burst out unexpectedly.

The three men looked around in surprise. Davidson's fists were clenched at waist height, her elbows splayed. After a moment Coster said, "All right." He dropped the muzzle of his rifle and began handing guns back into the van.

A mercury vapor streetlight threw a line of saw teeth through the venetian blinds to the wall above the couch. Penske lay there, fully clothed, watching

the whorls which his cigarette smoke etched across the pattern. The apartment was still.

Penske took a last drag on his cigarette. Its yellow-orange glow was momentarily brighter than the blue of the streetlight. He ground the butt out in the dish with the others and the crumpled pack from which they had come. Then Penske swung his feet over the side of the couch and stood, his right hand silently drawing his knife from its sheath in the same motion. He glided across the worn carpet to the door of Coster's room.

For a moment the swarthy man waited with his ear pressed against the panel. There was no sound within. The door did not have a working latch; its hinges were nearly silent. Penske pulled the door open just enough to slip through into the pitch-dark bedroom. His whole body followed the knife as if he were a serpent and the blade was his questing tongue.

There was a metallic click from the bed, tiny and lethal as a cobra.

"The light switch is on the right," Coster said quietly. "Better flip it on. Carefully."

Penske's hand found the switch. The room was narrow. The bed lay along its axis, the foot of it pointing to the door. The M14 pointed down that same axis. Coster's index finger was within the trigger guard. The safety catch had clicked as it slid forward. The shorter man stared at the muzzle brake of the automatic rifle. He remembered the way bullets had shredded the earth-filled jug that morning. Now his blood and tissue and splinters of his bones would spray the inside of the door panel.

"Put your knife away," Coster said.

The shorter man only blinked.

"We're not here to kill you, Penske," said the automatic rifleman. His voice was calm, almost wheedling. "Put your knife away and close my door behind you. It'll all look different tomorrow. Kawan-

ishi will be dead, and you'll have as much of the credit for it as you want."

Penske swallowed and began to back through the doorway. The gun muzzle wagged disapproval. "First the knife," Coster said.

The shorter man hunched over, his eyes on the rifle except for quick dips down to the strait boot sheath. He jabbed the point into the flesh above his ankle the first time he tried. At last he succeeded.

"Fine," said the rifleman. "You can go now."

Penske's face contorted with rage. "You bastard, you gotta sleep sometime!" he said.

Coster smiled like a skull. "Do we?"

The swarthy man slammed the door, turned, and jumped back before he realized that the figure hulking on the arm of the couch was Kerr. "What're you doing up?" Penske demanded in a husky whisper.

Kerr shrugged. "Let's go out on the landing," he said. "Dee's asleep." But it was toward the rectangle of light around Coster's door that he nodded.

The second-floor apartment was served by an outside staircase. Its landing formed a small railed balcony, open to crisp air and the stars of early morning. Kerr waved Penske outside, then followed and swung the door closed behind them. The big man was barefoot, but he wore slacks and a shirt. The latter was unbloused to conceal his pistol.

Penske clenched his joined hands. "He can't shoot," he said in a low voice. "Not worth a damn."

"You could have fooled me, then," said Kerr. "What I saw this morning was pretty convincing."

"I tell you he's afraid of it!" Penske burst out. "The recoil, the noise even—he flinched every time Dee shot, and when he was shooting himself—I swear to *god* he kept his eyes shut!"

Kerr's fingers played at flaking paint from the bars of the railing. His complexion was richened to a true black in the wash of the street light. "It looked like

that to me, too," he admitted, "but he hit everything he shot at. He couldn't have done that if—if you were right."

"Unless that goddam rifle was alive," said Penske under his breath. He gripped the railing with both hands. His eyes were focused on the cars parked in the lot beneath them.

"Don't be a fool," Kerr snapped.

"George, I've *seen* people who can shoot," Penske said urgently. "That bastard's not one of 'em. Besides, *nobody's* that goddam good to shoot like he did off-hand. Nobody human. He got it somewhere, and he trained it up to look like'n M14 and shoot for him. Christ, he don't even know the difference from one kinda ammo and another. But it don't matter 'cause he's trained this—thing—and it's just like a guard dog." The little man paused, breathing deeply. "Or a witch cat," he added.

Kerr's index finger began to massage the gum above his bad tooth. "That's nonsense," he muttered around his hand. He did not look at Penske.

The smaller man touched Kerr's wrist. "It *fits*, George," he said. "It's the only goddam thing that does. The whole truth an' nothing but."

Kerr pursed his lips and said, "If we suppose that . . . what you say . . . could be true, does that change anything?"

"It changes—" Penske blurted, but he stopped when Kerr raised his hand. The question had been rhetorical.

"We accepted him as a man with a sophisticated weapon," the big man continued as if he had not been interrupted. "That's no less true now than it was. And our need for his weapon is no less real."

Penske blinked. "Maybe you know what you're doing. But I don't like it."

Kerr patted him on the shoulder. "After tomorrow it won't matter," he said. "After this morning, that is."

Let's both get some sleep."

Coster's door was dark when the two men re-entered the silent apartment. Everything was peaceful. Penske wondered briefly at what would have happened if instead they had returned determined to kill the automatic rifleman. He took his mind off that thought as he would have taken his hand off a scorpion.

The three men in the back of the van were each expressionless in a different way. Davidson swung to the curb in front of the office building. The street was marked "No Parking" but there was little traffic this early on a Saturday morning. Kerr nodded minusculely. Penske, carrying a Dewar's carton, scrambled out the back door. Coster followed with a long flat box stencilled "Ajax Shelving—Light—Adjustable—Efficient." His right hand reached through a hole in the side of the box, but a casual onlooker would not have noticed that.

The entranceway door was locked. After a moment's fumbling with the key Kerr had procured, Penske pulled it open. Behind them, the assassins heard the van pull away. It would wait in the lot of a nearby office building until time to pick them up.

The hallways were empty and bright under their banks of fluorescents. Coster stepped toward the elevators but Penske motioned him aside. "We take the fire stairs," he said. "Get in a elevator'n you got no control. We can't afford that."

The stairs were narrow and sterile, gray concrete steps in a dingy yellow well. Penske slipped once as he took two hurrying steps at a time, barking his shins and falling with a clatter on the box he carried. He got up cursing and continued to leap steps, but now he held the liquor carton in his right hand and gripped the square iron rail with his left. At the third floor landing, the little man pulled open the door and

peered suspiciously down the hall.

"Clear," he said, stepping through. He let the door swing closed as Coster grabbed for it. Penske was opening an office with another key when the rifleman joined him. Then they were inside, the hall door closed and the fluorescents in the ceiling flickering into life.

Coster threw down the shelving box and caressed the M14 with both hands. Penske squatted on the carpet as he reassembled the stock and action of his carbine. He sneered, "You shoulda took that down 'steada hauling a goddam box that size around. Or don't you know how?"

"I don't take him down," said Coster. "You handle your end, I'll handle mine."

Penske strutted into the inner office. From the letterheads on the desks, the suite was connected in some fashion or other to the university. The swarthy man pushed a swivel chair aside and raised the venetian blinds. "There," he said, waving. "There's where the bastards'll be."

Coster's slight smile did not change as he ducked a little to follow Penske's gesture. The rifleman had not visited the ambush site before. The window looked out on a parking lot, almost empty now, and the back street which formed a one-way pair with the street in front of the building. Beyond the lot and the street was a chain-link fence surrounding the building that sprawled across the whole block. The gates were open, but there was a guardhouse with a sign which read, "Carr Industries—Knitwear Division."

The name had amused Kerr.

In the paved yard between the gates and the two-story mill were already gathered a score of newsmen and perhaps an equal number of plain-clothes security personnel. Many of the latter carried attaché cases and binoculars. They looked bored and uncomfortably warm in their suits.

The phone beside Penske rang. He jumped, wagging his carbine. Coster grinned and lifted the instrument out of its cradle. He offered it to the shorter man. Penske glowered. "Yeah, everything's goddam fine," he said. "Just don't screw up yourself." He laid the receiver down on the desk instead of hanging up. At the other end of the open line was Kerr in a sidewalk phone booth. The sound of the shots through the telephone was the signal to start the van toward the pick-up point.

Coster swung the lowest window into the room. He pushed the desk further aside and knelt with the rifle muzzle a yard back from the frame. The relative gloom of the office shielded them from the security men who were dutifully sweeping windows and rooftops with their binoculars. Coster grinned in satisfaction. He lowered the automatic rifle and began scanning the crowd left-handed through the glasses Penske had brought.

"Gonna spray the whole load a' the bastards?" Penske asked. "Supposed to be some big mother from the State Department, too."

"Nobody dies but Kawanishi," said Coster. He did not take his eyes from the binoculars. "We'd lose the effect, otherwise."

Penske grunted. Coster grimaced at him and explained, "If Martin Luther King had been gunned down with thirty whites, there would have been doubt as to just . . . what we had in mind. It would have been an accident, not an attack—and maybe no cities had burned. American officials can die at, say, a Memorial Day parade. Here, only the Japanese. Only a slant-eyed Nip." He turned back to the crowd.

The swarthy man stared at the side of Coster's head. His right hand began a stealthy, not wholly conscious, movement to his boot. As his fingers touched the knife, there was a sharp snap. Penske jumped as he had when the phone rang. The rifle lay

across Coster's lap, its muzzle pointing at Penske. The safety had just clicked off.

The rifleman set the binoculars down between them. "Don't even think of that," he said.

Penske's lips were dry, but he nodded.

There was a bustle around the mill entrance. Uniformed officers had joined the plain-clothes team and were forming a double cordon against the gathering sightseers. Down the cordon and in through the gate drove a city police car with its bar lights flashing, followed by a trio of limousines. The first of the black cars disgorged its load of civilians, both Westerners and Japanese. "Small fry," mumbled Coster beneath the binoculars.

A security man from the third, open-topped, limousine ran to the rear door of the second big car and opened it. A tall, gray-haired man in a dark suit got out. He nodded and reached a hand back to help his companion.

"Yes . . .," Coster breathed. He dropped the glasses and fitted his left hand to the forward grip of the automatic rifle. A stocky man, shorter than the first, straightened and waved to the cameras. Then he hurtled forward, face-first onto a patch of concrete already darkened by the spray of his blood.

The BAM BAM of the two-round burst struck the office like hammerblows. A Daumier print on the wall jarred loose and fell. Coster scrambled back to the outer office. Penske waited a moment, his eardrums still jagged from the punishing muzzle blasts. Three security men were thrusting the Undersecretary of State back into the armored limousine like a sacked quarterback. Cut-down Uzis had come out of the attaché cases, but they were useless without targets. A cluster of security men was shouting into walkie-talkies while trying to shield Kawanishi's body. They were useless too. Kawanishi was beyond human help, his spine shattered by two bullets.



Penske broke for the door, leaving his carbine and the binoculars where they lay. He could replace them in the van. They were too dangerous to be seen carrying now. The stairwell door was still bouncing when the shorter man reached it. Coster was taking the steps two and three at a time, his right hand hugging the rifle to him through the hole in the carton. Penske, unburdened, was only a step behind when the rifleman turned at the second-floor landing, lost his footing on the painted concrete, and slid headlong down the next flight of steps. The crack of his right knee on the first step was louder than contact alone could explain.

Penske paused, staring down at the rifleman. Coster's face was a sallow green. "Give me a hand," he wheezed, trying unsuccessfully to rise.

"You'll never make it with a broken kneecap," the swarthy man said, more to himself than to the fallen man.

"God damn you!" Coster shouted. He had flung the shielding carton away from the automatic rifle. He aimed the weapon at Penske's midriff. "Help me!"

The safety clicked on. Both men heard the sound. Coster went a shade still paler and tried to force the slotted bar forward with his index finger. It would not move.

"Sure, I'll help you," Penske said softly. He slipped his dagger from its sheath and stepped forward.

The van was waiting at the curb with its rear door ajar. Penske leaped in, thrusting the carton before him. He shouted, "Drive!"

"Wait!" Kerr snapped to Davidson. "Where's Coster?"

Penske had the automatic rifle out on his lap now. He was feeling a little dizzy. "He fell and I had to leave him," he said. "Don't worry—he won't talk."

Without further orders, Davidson swung the van out into traffic. Occasional pedestrians were looking around for the source of the sirens they heard, but no one gave the escape vehicle a second glance.

Kerr's eyes narrowed as he watched the smaller man's fingers play with the action of the automatic rifle. After a moment he said, "Well, maybe it's for the best."

Penske did not reply. His mind was filling with images of men staggering and falling, each scene a separate shard differing in costume and background. Together the images turned smoothly like gear teeth engaging, each a part of a construct as yet incomplete.

"You know, I don't think I ever got a chance to look at that," Kerr remarked conversationally. He reached out to take the weapon.

"No!" said Penske, and the automatic rifle swung to cover the black's chest.

For an instant Kerr thought of drawing his pistol,

but the thought passed and the pressure on the trigger of the automatic rifle passed also. "Okay," the big man said, "so long as you shoot what you're told to shoot with it."

Penske was no longer listening. The pattern was now complete. It stretched from a cold world whose remaining energies were all harnessed in a great design, to an Earth without native life forms. Winds whipped sand and nerve gas around badlands carved in past millenia, and the poisoned seas surged against blue-glowing shorelines. But over those land-scapes coursed metal creatures who glittered and shifted their forms and raised triumphant cities to the skies.

And in Penske's mind something clicked. A voice said in no human language, "Yes, this replacement will be quite satisfactory"

—David Drake

THE HAPPY DAYS AHEAD

An all-new 30,000 word analysis
of what's right—and wrong—with America
(and what to do about it!)

by Robert Heinlein

Excerpted
from
Expanded Universe

***"It does not pay a prophet
to be too specific."***

—L. Sprague de Camp

***"You never get rich
peddling gloom."***

—William Lindsay Gresham

The late Bill Gresham was, before consumption forced him into fiction writing, a carnie mentalist of great skill. He could give a cold reading that would scare the pants off a marble statue. In six words he summarized the secret of success as a fortuneteller. Always tell the mark what he wants to hear. He will love you for it, happily pay you, then forgive and forget when your cheerful prediction fails to come true—and always come back for more.

Stockbrokers stay in business this way; their tips are no better than guesses but they are *not* peddling dividends; they are peddling happiness. Millions of priests and preachers have used this formula, promising eternal bliss in exchange for following, or at least giving lip service to, some short and tolerable rules, plus a variable cash fee not too steep for the customer's purse . . . and have continued to make this formula work *without ever in all the years producing even one client who had actually received the promised prize.*

Then how do churches stay in business? Because, in talking about "Pie in the Sky, By and By," they offer happiness and peace of mind *right here on Earth.* When

Karl Marx said, "Religion is the opium of the people," he was not being cynical or sarcastic; he was being correctly descriptive. In the middle nineteenth century opium was the *only* relief from intolerable pain; Karl Marx was stating that faith in a happy religion made the lives of the people of the abyss tolerable.

Sprague de Camp is Grand Master of practically everything and probably the most learned of all living practitioners of science fiction and fantasy. I heard those words of wisdom from him before I wrote the 1950 version of PANDORA'S BOX. So why didn't I listen? Three reasons: 1) money; 2) money; and 3) I thought I could get away with it during my lifetime for predictions attributed to 2000 A.D. I never expected to live that long; I had strong reasons to expect to die young. But I seem to have more lives than a cat; it may be necessary to kill me by driving a steak through my heart (sirloin by choice), then bury me at a crossroads.

Still, I could have gotten away with it if I had stuck to predictions that could not mature before 2000 A.D. Take the two where I *really* flopped, #5 and #16. *In both cases I named a specific year short of 2000 A.D.* Had I not ignored Mr. de Camp's warning, I could look bland and murmur, "Wait and see. Don't be impatient," on all in which the prediction does not look as promising in 1980 as it did in 1950.

Had I heeded a wise man on 2 out of 19 I could today, by sheer brass, claim to be batting a thousand.

I have made some successful predictions. One is "The Crazy Years." (Take a look out your window. Or at your morning paper.) Another is the water bed. Some joker tried to patent the water bed to shut out competition, and discovered that he could not because it was in the public domain, having been described in detail in STRANGER IN A STRANGE LAND. It had been mentioned in stories of mine as far back as 1941 and several times after that, but not until STRANGER

did the mechanics of a scene require describing how it worked.

It was *not* the first man to build water beds who tried to patent it. The first man in the field knew where it came from; he sent me one, free and freight prepaid, with a telegram naming his firm as the "Share-Water Bed Company." Q.E.D.

Our house has no place to set up a water bed. None. So that bed is still in storage a couple of hundred yards from our main house. I've owned a water bed from the time they first came on market—but have never slept in one.

I designed the water bed during years as a bed patient in the middle thirties: a pump to control water-level, side supports to permit one to float rather than simply lying on a not-very-soft water-filled mattress, thermostatic control of temperature, safety interfaces to avoid all possibility of electrical shock, waterproof box to make a leak no more important than a leaky hot water bottle rather than a domestic disaster, calculation of floor loads (important!), internal rubber mattress, and lighting, reading, and eating arrangements—an attempt to design the perfect hospital bed by one who had spent too *damned* much time in hospital beds.

Nothing about it was eligible for patent—nothing new—unless a sharp patent lawyer could persuade the examiners that a working assemblage enabling a person to sleep on water involved that—how does the law describe it?—"flash of inspiration" transcending former art. But I never thought of trying; I simply wanted to build one—but at that time I could not have afforded a custom-made soapbox.

But I know exactly where I got the idea. In 1931, a few days after the radio-compass incident described in the afterword to SEARCHLIGHT, I was ordered to Fort Clayton, Canal Zone, to fire in Fleet Rifle & Pistol Matches. During that vacation-with-pay I often re-

turned from Panama City after taps, when all was quiet. There was a large swimming pool near the post gate used by the Navy and our camp was well separated from the Army regiment barracked there.

I would stop, strip naked, and have a swim—nonreg (no life guards) but no one around, and regulations are made to be broken.

Full moon occurred about the middle of Fleet Matches—and I am one of those oddies who cannot sink, even in fresh water (which this was). The water was blood warm, there was no noise louder than night jungle sounds, the Moon blazed overhead, and I would lie back with every muscle relaxed and stare at it—fall into it—wonder whether we would get there in my lifetime. Sometimes I dozed off.

Eventually I would climb out, wipe my feet dry with a hanky, pull on shoes, hang clothes over my arm, and walk to my tent in the dark. I don't recall ever meeting anyone but it couldn't matter—dark, all male, surrounded by armed sentries, and responsible myself only to a Marine Corps officer junior to me but my TDY boss as team captain—and he did not give a hoot what I did as long as I racked a high score on the range (and I did, largely because my coach was a small wiry Marine sergeant nicknamed "Deacon"—who reappears as survival teacher in TUNNEL IN THE SKY).

Some years later, bothered by bed sores and with every joint aching no matter what position I twisted into, I thought often of the Sybaritic comfort of floating in blood-warm water at night in Panama—and wished that it could be done for bed patients . . . and eventually figured out how to do it, all details, long before I was well enough to make working drawings.

But 1) I never expected one to be built; 2) never thought of them (except for myself) other than as hospital beds; 3) never expected them to be widely used by a fair percentage of the public; 4) and never dreamed that they would someday be advertised by motels for romantic-exotic-erotic weekends along with X-rated films on closed-circuit TV.

By stacking the cards, I'm about to follow the advice of both Bill Gresham and Sprague de Camp. First, I will paint a gloomy picture of what our future may be. Second, I'll offer a cheerful scenario of how wonderful it *could* be. I can afford to be specific as each scenario will deny everything said in the other one (de Camp), and I can risk great gloom in the first because I'll play you out with music at the end (Gresham).

GLOOM, WOE, AND DISASTER—There are increasing pathological trends in our culture that show us headed down the chute to self-destruction. These trends do *not* require that we be conquered—wait a bit and we will fall into the lap of whichever power cares to occupy us. I'll list some of these trends and illustrate (rather than prove) what I mean. But it would be tediously depressing to pile up convincing proof—I'm not running for office. I *do have* proof, on file right in this room. I started clipping and filing by categories on trends as early as 1930 and my "youngest" file was started in 1945.

Span of time is important; the 3-legged stool of understanding is held up by **history**, **languages**, and **mathematics**. Equipped with these three you can learn anything you want to learn. But if you lack *any one* of them you are just another ignorant peasant with dung on your boots.

A few years ago I was visited by an astronomer, young and quite brilliant. He claimed to be a long-time reader of my fiction and his conversation proved it. I was telling him about a time I needed a synergistic orbit from Earth to a 24-hour station; I told him what story it was in, he was familiar with the scene, mentioned having read the book in grammar school.

This orbit is similar in appearance to cometary interplanet transfer but is in fact a series of compromises in order to arrive in step with the space station; elapsed time is an unsmooth integral not to be found in Hudson's Manual but it can be solved by the methods used on Siacci empiricals for atmosphere ballistics: numerical integration.

I'm married to a woman who knows more math, history, and languages than I do. This should teach me humility (and sometimes does, for a few minutes). Her brain is a great help to me professionally. I was telling this young scientist how we obtained yards of butcher paper, then each of us worked three days, independently, solved the problem and checked each other—then the answer disappeared into *one* line of *one* paragraph (SPACE CADET) but the effort had been worthwhile as it controlled what I could do dramatically in that sequence.

Doctor Whoosis said, "But *why* didn't you just shove it through a computer?"

I blinked at him. Then said slowly, gently, "My dear boy—" (I don't usually call Ph.D.'s in hardcore sciences "My dear boy"—they impress me. But this was a special case.)

"My dear boy . . . this was 1947."

It took him some seconds to get it, then he blushed.

Age is not an accomplishment and youth is no sin. This young man was (is) brilliant, skilled in mathematics, had picked German and Russian for his doctorate. At the time I met him he seemed to lack feeling for historical span . . . but, if true, I suspect that it began to itch him and he made up that lack either formally or by reading. Come to think of it, much of my own knowledge of history derives not from history courses but from history of astronomy, of war and military art, and of mathematics, as my formal history study stopped with Alexander and resumed with Prince Henry the Navigator. But to understand the history of those three subjects, you *must* branch out into general history.

Span of time—the Decline of Education

My father never went to college. He attended high school in a southern Missouri town of 3000+, then attended a private 2-year academy roughly analogous to junior college today, except that it was *very* small—had to be; a day school, and Missouri had no paved roads.

Here are some of the subjects he studied in back-country 19th century schools: Latin, Greek, physics (natural philosophy), French, geometry, algebra, 1st year calculus, bookkeeping, American history, World history, chemistry, geology.

Twenty-eight years later I attended a much larger city high school. I took Latin and French but Greek was not offered; I took physics and chemistry but geology was not offered. I took geometry and algebra but calculus was not offered. I took American history and ancient history but no comprehensive history course was offered. Anyone wishing comprehensive history could take (each a one-year 5-hrs/wk course) ancient history, medieval history, modern European history, and American history—and note that the available courses ignored all of Asia, all of South America, all of Africa except ancient Egypt, and touched Canada and Mexico solely with respect to our wars with each.

I've had to repair what I missed with a combination of travel and private study . . . and must admit that I did not tackle Chinese history in depth until this year. My training in history was so spotty that it was not until I went to the Naval Academy and saw captured battle flags that I learned that we fought Korea some *eighty years* earlier than the mess we are still trying to clean up.

From my father's textbook I know that the world history course he studied was not detailed (how could it be?) but at least it treated the world as *round*; it did not ignore three fourths of our planet.

Now, let me report what I've seen, heard, looked up, clipped out of newspapers and elsewhere, and read in books such as **WHY JOHNNY CAN'T READ, BLACKBOARD JUNGLE**, etc.

Colorado Springs, our home until 1965, in 1960 offered first-year Latin—but that was all. Caesar, Cicero, Virgil—Who dat?

Latin is not taught in the high schools of Santa Cruz County. From oral reports and clippings I note that it is not taught in most high schools across the country.

"Why this emphasis on Latin? It's a dead language!" Brother, as with jazz, in the words of a great artist, "If you have to ask, you ain't never goin' to find out." A person who knows *only* his own language does not even know his *own* language; epistemology necessitates knowing more than one human language. Besides that sharp edge, Latin is a giant help in *all* the sciences—and so is Greek, so I studied it on my own.

A friend of mine, now a dean in a state university, was a tenured professor of history—but got rified when history was eliminated from the required subjects for a bachelor's degree. His courses (American history) are still offered but the one or two who sign up, he tutors; the overhead of a classroom cannot be justified.

A recent *Wall Street Journal* story described the bloodthirsty job hunting that goes on at the annual meeting of the Modern Languages Association; modern languages—even English—are being deemphasized right across the country; there are more professors in MLA than there are jobs.

I mentioned elsewhere the straight-A student on a scholarship who did not know the relations between weeks, months, and years. This is not uncommon; high school and college students in this country usually can't do simple arithmetic without using a pocket calculator. (I mean with pencil on paper; to ask one to do *mental* arithmetic causes jaws to drop—say 17×34 , done mentally. How? Answer: Chuck away the 34 but remember it. $(10 + 7)^2$ is 289, obviously. Double it: $2(300 - 11)$, or 578.

But my father would have given the answer at once, as his country grammar school a century ago required *perfect* memorizing of multiplication tables *through* $20 \times 20 = 400$. . . so his ciphering the above would have been merely the doubling of a number already known (289)—or 578. He might have done it again by another route to check it: $(68 + 510)$ —but his hesitation would not have been noticeable.

Was my father a mathematician? Not at all. Am I? Hell, no! This is the simplest sort of kitchen arithmetic, the sort *that high school students can no longer do*—at least in Santa Cruz.

If they don't study math and languages and history, what *do* they study? (**Nota Bene!** Any student can learn the truly tough subjects *on almost any campus if he/she wishes*—the professors and books and labs are there. But the student must *want* to.)

But if that student does not want to learn anything requiring brain sweat, most U.S. campuses will babysit him 4 years, then hand him a baccalaureate for not burning down the library. That girl in Colorado Springs who studied Latin—but no classic Latin—got a “general” bachelor's degree at the University of Colorado in 1964. I attended her graduation, asked what she had majored in. No major. What had she studied? Nothing, really, it turned out—and, sure enough, she's as ignorant today as she was in high school.

Santa Cruz has an enormous, lavish 2-year college and also a campus of the University of California, degree granting through Ph.D. level. But, since math and languages and history are not required, let's see how they fill the other classrooms.

The University of California (all campuses) is classed as a “tough school.” It is paralleled by a State University system with lower entrance requirements, and this is paralleled by local junior colleges (*never* called “junior”) that accept any warm body.

UCSC was planned as an elite school (“The Oxford of the West”) but falling enrollment made it necessary to accept any applicant who can qualify for the University of California as a whole; therefore UCSC now typifies the “statewide campus.” Entrance can be by examination (usually College Entrance Examination Boards) or by high school certificate. Either way, admission requires a certain spread—2 years of math, 2 of a modern language, 1 of a natural science, 1 of

American history, 3 years of English—and a level of performance that translates as B+. There are two additional requirements: English composition, and American History and Institutions. The second requirement acknowledges that some high schools do not require American history; UCSC permits an otherwise acceptable applicant to make up this deficiency (with credit) after admission.

The first additional requirement, English composition, can be met by written examination such as CEEB, or by transferring *college* credits considered equivalent, or, lacking either of these, by passing an examination given at UCSC at the start of each quarter.

The above looks middlin' good on the surface. College requirements from high school have been watered down somewhat (or more than somewhat) but that B+ average as a requirement looks good . . . *if* high schools are teaching what they taught two and three generations ago. The rules limit admission to the upper 8% of California high school graduates (out-of-state applicants must meet slightly higher requirements).

8%— So 92% fall by the wayside. These 8% are the intellectual elite of young adults of the biggest; richest, and most lavishly educated state in the Union.

Those examinations for the English-composition requirement: How can anyone fail who has had 3 years of high school English and averages B+ across the board?

If he fails to qualify, he may enter but must take at once (no credit) "Subject A"—better known as "Bonehead English."

"Bonehead English" must be repeated, if necessary, until passed. To be forced to take this no-credit course does *not* mean that the victim splits an occasional infinitive, sometimes has a dangling modifier, or a failure in agreement or case—he can even get away with such atrocities as "—like I say—."

It means that he has reached the Groves of Academe

unable to express himself by writing in the English language.

It means that his command of his native language does not equal that of a 12-year-old country grammar school graduate of ninety years ago. It means that he verges on subliterate but that his record is such in other ways that the University will tutor him (no credit and for a fee) rather than turn him away.

But, since these students are the upper 8% and each has had not less than three years of high school English, it follows that only the exceptionally unfortunate student needs "Bonehead English." That's right, isn't it? Each one is eighteen years old, old enough to vote, old enough to contract or to marry without consulting parents, old enough to hang for murder, old enough to have children (and some do); all have had 12 years of schooling including 11 years of English, 3 of them in high school.

(Stipulated: California has special cases to whom English is not native language. But such a person who winds up in that upper 8% is usually—I'm tempted to say "always"—fully literate in English.)

So here we have the cream of California's young adults—each has learned to read and write and spell and has been taught the basics of English during eight years in grammar school, and has polished this by not less than three years of English in high school—and also has had at least two years of a second language, a drill that vastly illuminates the subject of grammar even though grasp of the second language may be imperfect.

It stands to reason that *very* few applicants need "Bonehead English." Yes?

No!

I have just checked. The new class at UCSC is "about 50%" in Bonehead English—and this is normal—normal right across California—and California is no worse than most of the states.

8% off the top—

Half of this elite 8% must take "Bonehead English."

The prosecution rests.

This scandal must be charged to grammar and high school teachers . . . many of whom are not themselves literate (I know!)—but are not personally to blame, *as we are now in the second generation of illiteracy*. The blind lead the blind.

But what happens after this child (sorry—young adult citizen) enters UCSC?

I TELL YOU THREE TIMES I TELL YOU THREE TIMES I TELL YOU THREE TIMES: A student who *wants* an education can get one at UCSC in a number of very difficult subjects, plus a broad general education.

I ask you never to forget this while we see how one can slide through, never do any real work, never learn anything solid, and still receive a bachelor of arts degree from the prestigious University of California. Although I offer examples from the campus I know best, I assume conclusively that this can be done throughout the state, as it is one statewide university operating under one set of rules.

Some guidelines apply to any campus: Don't pick a medical school or an engineering school. Don't pick a natural science that requires difficult mathematics. (A subject called "science" that does *not* require difficult mathematics usually is "science" in the sense that "Christian Science" is science—in its widest sense "science" simply means "knowledge" and anyone may use the word for any subject . . . but shun the subjects that can't be understood without mind-stretching math.)

Try to get a stupid but good-natured adviser. There are plenty around, especially in subjects in which to get a no-sweat degree; Sturgeon's Law applies to professors as well as to other categories.

For a bachelor's degree:

1) You must spend the equivalent of one academic year in acquiring "breadth"—but wait till you see the goodies!

2) You must take the equivalent of one full academic year in your major subject in upper division courses, plus prerequisite lower division courses. Your 4-year program you must rationalize to your adviser as making sense for your major ("Doctor, I picked *that* course because it *is* so far from my major—for perspective. I was getting too narrow." He'll beam approvingly . . . or you had better look for a stupider adviser).

3) Quite a lot of time will be spent off campus but counted toward your degree. This should be fun, but it can range from hard labor at sea, to counting noses and asking snoopy questions of "ethnics" (excuse, please!), to time in Europe or Hong Kong, et al., where you are in danger of learning something new and useful even if you don't try.

4) You will be encouraged to take interdisciplinary majors and are invited (urged) to invent and justify unheard-of new lines of study. For this you need the talent of a used-car salesman as *any* aggregation of courses can be sold as a logical pattern if your "new" subject considers the many complex relationships between three or four or more old and orthodox fields. Careful here! If you are smart enough to put this over, you may find yourself not only *earning* a baccalaureate but in fact doing original work worthy of a Ph.D. (You won't get it.)

5) You must have at least one upper-division seminar. Pick one in which the staff leader likes your body odor and you like his. ("I do not like thee, Dr. Fell; the reason why I cannot tell—") But you've at least two years in which to learn which professors in your subject are simpatico, and which ones to avoid at any cost.

6) You must write a 10,000 word thesis on your chosen nonsubject and may have to defend it orally. If you can't write 10,000 words of bull on a bull subject, you've made a mistake—you may have to *work* for a living.

The rules above allow plenty of elbowroom; at least three out of four courses can be elective and the re-

mainder elective in part, from a long menu. We are still talking *solely* about nonmathematical subjects. If you are after a Ph.D. in astronomy, UCSC is a wonderful place to get one . . . but you will start by getting a degree in physics including the toughest of mathematics, and will study also chemistry, geology, technical photography, computer science—and will resent any time not leading toward the ultra-interdisciplinary subject lumped under the deceptively simple word “astronomy.”

Breadth—the humanities, natural science, and social science—1/3 in each, total 3/3 or one academic year, but spread as suits you over the years. Classically “the humanities” are defined as literature, philosophy, and art—but history has been added since it stopped being required in college and became “social studies” in secondary schools. “Natural science” does not necessarily mean what it says—it can be a “non-alcoholic gin”; see below. “Social science” means that grab bag of studies in which answers are matters of opinion.

Courses satisfying “breadth” requirements **Humanities**

Literature and Politics—political & moral choices in literature

Philosophy of the Self

Philosophy of History in the Prose and Poetry of W. B. Yeats

Art and the Perceptual Process

The Fortunes of Faust

Science and the American Culture (satisfies both the Humanities requirement and the American History and Institutions requirement *without* teaching *any* science or *any* basic American History. A companion course, *Science and Pressure Politics*, satisfies both the Social Sciences requirement and the American History and Institutions requirement while teaching still less; it concentrates on post-World-War-II period and concerns scientists as lobbyists and their own inter-

actions [rows] with Congress and the President. Highly recommended as a way to avoid learning American history or very much social "science.")

American Country Music—Whee! You don't play it, you listen.

Man and the Cosmos—philosophy, sorta. Not science.

Science Fiction (I refrain from comment.)

The Visual Arts—"What, if any, are the critical and artistic foundations for judgment in the visual arts?"—exact quotation from catalog.

Mysticism—that's what it says.

(The above list is incomplete.)

Natural Science requirement

General Astronomy—no mathematics required

Marine Biology—no mathematics required

Sound, Music, and Tonal Properties of Musical Instruments—neither math nor music required for this one!

Seminar: Darwin's Explanation

Mathematical Ideas—for nonmathematicians; requires only that high school math you must have to enter.

The Phenomenon of Man—"—examine the question of whether there remains any meaning to human values." (Oh, the pity of it all!)

Physical Geography: Climate

The Social "Sciences" requirement

Any course in Anthropology—many have no prereq.

Introduction to Art Education—You don't have to make art; you study how to teach it.

Music and the Enlightenment—no technical knowledge of music required. This is a discussion of the effect of music on philosophical, religious, and social ideas, late 18th–early 19th centuries. That is what it says—and it counts as "social science."

The Novel of Adultery—and this, too, counts as "so-

cial science." I don't mind anyone studying this subject or teaching it—but I object to its being done on my (your, our) tax money. (P.S. The same bloke teaches science fiction. He doesn't *write* science fiction; I don't know what his qualifications are in this other field.)

Human Sexuality

Cultural Roots for Verbal and Visual Expression—a fancy name of still another "creative writing" class with frills—the students are taught how to draw out "other culture" pupils. So it says.

All the 30-odd "*Community Studies*" courses qualify as "social science," but I found myself awed by these two: *Politics and Violence*, which studies, among other things, "political assassination as sacrifice" and *Leisure and Recreation in the Urban Community* ("Bread and Circuses").

Again, listing must remain incomplete; I picked those below as intriguing:

Seminar: Evil and the Devil in the Hindu Tradition.

Science and Pressure Politics—already mentioned on page 529 as the course that qualifies both as social "science" and as American History and Institutions while teaching an utter minimum about each. The blind man now has hold of the elephant's tail.

The Political Socialization of La Raza—another double header, social "science" and American History and Institutions. It covers greater time span (from 1900 rather than from 1945) but it's like comparing cheese and chalk to guess which one is narrower in scope in either category.

The name of this game is to plan a course involving minimum effort and minimum learning while "earning" a degree under the rules of the nation's largest and most prestigious state university.

To take care of "breadth" and also the American history your high school did not require I recommend *Science and Pressure Politics*, *The Phenomenon of Man*,

and *American Country Music*. These three get you home free without learning *any* math, history, or language that you did not already know . . . and without sullyng your mind with science.

You must pick a major . . . but it must *not* involve mathematics, history, or actually being able to *read* a second language. This rules out *all* natural sciences (this campus's greatest strength).

Anthropology? You would learn something in spite of yourself; you'd get interested. Art? Better not major in it without major talent. Economics can be difficult, but also and worse, you may incline toward the Chicago or the Austrian school and not realize it until your (Keynesian or Marxist) instructor has failed you with a big black mark against your name. Philosophy? Easy and lots of fun and absolutely guaranteed not to teach you anything while loosening up your mind. In more than twenty-five centuries of effort *not one* basic problem of philosophy has *ever* been solved . . . but the efforts to solve them are most amusing. The same goes for comparative religion as a major: You won't actually *learn* anything you can sink your teeth into . . . but you'll be vastly entertained—if the Human Comedy entertains you. It does me.

Psychology, Sociology, Politics, and Community Studies involve not only risk of learning something—not much, but *something*—and each is likely to involve real work, tedious and lengthy.

To play this game and win, with the highest score, it's Hobson's choice: American literature. I assume that you did not have to take Bonehead English and that you can type. In a school that has no school of education (UCSC has none) majoring in English Literature is the obvious way to loaf through four years. It will be necessary to cater to the whims of professors who know no more than you do about anything that matters . . . but catering to your mentors is necessary in any subject not ruled by mathematics.

Have you noticed that professors of English and/or

American Literature are not expected to be proficient in the art they profess to teach? Medicine is taught by M.D.'s on living patients, civil engineering is taught by men who in fact have built bridges that did not fall; law is taught by lawyers; music is taught by musicians; mathematics is taught by mathematicians—and so on.

But is—for example—the American Novel taught by American novelists?

Yes. Occasionally. But so seldom that the exceptions stand out. John Barth. John Erskine fifty years ago. Several science-fiction writers almost all of whom were selling writers long before they took the King's Shilling. A corporal's guard in our whole country out of battalions of English profs.

For a Ph.D. in American/English literature a candidate is not expected to *write* literature; he is expected to *criticize* it.

Can you imagine a man being awarded an M.D. for writing a *criticism* of some great physician without ever himself having learned to remove an appendix or to diagnose *Herpes zoster*? And for that dissertation then be hired to *teach* therapy to medical students?

There is, of course, a reason for this nonsense. The rewards to a competent novelist are so much greater than the salaries of professors of English at even our top schools that once he/she learns this racket, teaching holds no charms.

There are exceptions—successful storytellers who *like* to teach so well that they keep their jobs and write only during summers, vacations, evenings, weekends, sabbaticals. I know a few—emphasis on “few.” But most selling wordsmiths are lazy, contrary, and so opposed to any fixed regime that they will do *anything*—even meet a deadline—rather than accept a job.

Most professors of English *can't* write publishable novels . . . and many of them can't write nonfiction prose very well—certainly not with the style and distinction and grace—and content—of Professor of Biology Thomas H. Huxley. Or Professor of Astronomy

Sir Fred Hoyle. Or Professor of Physics John R. Pierce. Most Professors of English get published, when they do, by university presses or in professional quarterlies. But fight it out for cash against *Playboy* and Travis Magee? They can't and they don't!

But if you are careful not to rub their noses in this embarrassing fact and pay respectful attention to their opinions even about (ugh!) "creative writing," they will help you slide through to a painless baccalaureate.

You still have time for many electives and will need them for your required hours-units-courses; here are some fun-filled ones that will teach you almost nothing:

The Fortunes of Faust

Mysticism

The Search for a New Life Style

The American Dilemma—Are "all men equal"?

Enology—history, biology, and chemistry of wine-making and wine appreciation. This one will teach you something but it's too good to miss.

Western Occultism: Magic, Myth, and Heresy.

There is an entire college organized for fun and games ("aesthetic enrichment"). It offers courses for credit but you'll be able to afford noncredit activity as well in your lazyman's course—and *anything* can be turned into credit by some sincere selling to your adviser and/or Academic Committee. I have already listed nine of its courses but must add:

Popular Culture

—plus clubs or "guilds" for gardening, photography, filmmedia, printing, pottery, silkscreening, orchestra, jazz, etc.

Related are *Theater Arts*. These courses give credit, including:

Films of Fantasy and Imagination—fantasy, horror, SF, etc. (!)

Seminar on Films

Filmmaking

History and Aesthetics of Silent Cinema

History and Aesthetics of Cinema since Sound
Introduction to World Cinema

Sitting and looking at movies can surely be justified for an English major. Movies and television use writers—as little as possible, it's true. But somewhat; the linkage is there.

Enjoy yourself while it lasts. These dinosaurs are on their way to extinction.

The 2-year “warm body” campus is even more lavish than UCSC. It is a good trade school for some things—e.g., dental assistant. But it offers a smörgåsbord of fun—Symbolism of the Tarot, Intermediate Contract Bridge, Folk Guitar, Quilting, Horseshoeing, Chinese Cooking, Hearst Castle Tours, Modern Jazz, Taoism, Hatha Yoga Asanas, Aikido, Polarity Therapy, Mime, Raku, Bicycling, Belly Dancing, Shiatsu Massage, Armenian Cuisine, Revelation and Prophecy, Cake Art, Life Insurance Sales Techniques, Sexuality and Spirituality, Home Bread Baking, Ecuadorian Backstrap Weaving, The Tao of Physics, and lots, lots more! One of the newest courses is “The Anthropology of Science Fiction” and I’m still trying to figure that out.

I have no objection to any of this . . . but why should this kindergarten be paid for by *taxes*? “Bread and Circuses.”

I first started noticing the decline of education through mail from readers. I have saved mail from readers for forty years. Shortly after World War Two I noticed that letters from the youngest were not written but hand-printed. By the middle fifties deterioration in handwriting and in spelling became very noticeable. By today a letter from a youngster in grammar school or in *high school* is usually difficult to read and sometimes illegible—penmanship atrocious

(*pencilmanship*—nine out of ten are in soft pencil, with well-smudged pages), spelling unique, grammar an arcane art.

Most youngsters have not been taught how to fold $8\frac{1}{2}'' \times 11''$ paper for the two standard sizes of envelopes intended for that standard sheet.

Then such defects began to show up among college students. Apparently "Bonehead English" (taught everywhere today, so I hear) is not sufficient to repair the failure of grammar and high school teachers *who themselves in most cases were not adequately taught*.

I saw sharply this progressive deterioration because part of my mail comes from abroad, especially Canada, the United Kingdom, the Scandinavian countries, and Japan. A letter from any part of the Commonwealth is invariably neat, legible, grammatical, correct in spelling, and polite. The same applies to letters from Scandinavian countries. (Teenagers of Copenhagen usually speak and write English better than most teenagers of Santa Cruz.) Letters from Japan are invariably neat—but the syntax is sometimes odd. I have one young correspondent in Tokyo who has been writing steadily these past four years. The handwriting in the first letter was almost stylebook perfect but I could hardly understand the phrasing; now, four years later, the handwriting looks the same but command of grammar, syntax, and rhetoric is excellent, with only an occasional odd choice in wording giving an exotic flavor.

Our public schools no longer give good value. We remain strong in science and engineering but even students in those subjects are handicapped by failures of our primary and secondary schools and by cutback in funding of research both public and private. Our great decline in education is alone enough to destroy this country . . . but I offer no solutions because the only solutions I think would work are so drastic as to be incredible.

Span of Time—Decline in Patriotism and in the Quality of our Armed Forces

The high school I attended (1919–24) was an early experiment in the junior and senior high school method. The last year of grammar school was joined with the freshman class as “junior high” while the sophomores, juniors, and seniors were “senior high.”

There was a company of junior ROTC in junior high and two companies in senior high. Military training gave no credit and was not compulsory; it was neither pushed nor discouraged. A boy took it or not, as suited him and his parents. Some of the subfreshman (aet. ca. 13 an.) were barely big enough to tote a Springfield rifle.

Kansas City had a regiment of Federalized National Guard, with one authorized drill per week, 3 hours each Wednesday evening. For this a private was paid 69¢, a PFC got a dollar, and a corporal got big money—\$1.18.

The required & paid weekly drill was not all, as about half of the regiment showed up on Sundays at the “Military Country Club”—acres of raw wood lot until the regiment turned it into rifle range, club house, stables, etc. No pay for Sundays. Two weeks encampment per year, with pay. For most of the regiment, this was their only vacation, two weeks then being standard.

That regiment ran about 96% authorized strength.

About 1921 Congress authorized the CMTC, Citizens Military Training Corps. It proved very popular. A month of summer training in camp at an Army post, continued through 4 years, could (if a candidate's grades were satisfactory) result in certification for commission in the reserve. Civilians submitted to military discipline in CMTC but were not subject to court martial. Offenders could be sent home or turned over to civilian police, depending on the offense. There were few offenses.

CMTC candidates got 3¢ per mile to and from their homes, no other money.

In 1925 I was appointed midshipman. There were 51 qualified applicants trying for that one appointment.

240 of my class graduated; 130 fell by the wayside. *One* of that 130 resigned voluntarily; all the others resigned involuntarily, most of them plebe year for failure in academics (usually mathematics), the others were requested to resign over the next three years for academic, physical, or other reasons. A few resigned graduation day through having failed the final physical examination for commissioning. Three more served about one year in the Fleet, then resigned—but these three volunteered after the attack on Pearl Harbor. 28 of the 129 who left the service involuntarily managed to get back on active duty in World War Two.

So with four exceptions all of my class stayed in the Navy *as long as the Navy would have them*. About 25% were killed in line of duty or died later of wounds. Neither at the Academy nor in the Fleet did I ever hear a midshipman or officer talk about resigning. While it is likely that some thought about it, all discussion tacitly carried the assumption that the Navy was our life, the Fleet our home, and that we would leave only feet first or when put out to pasture as too old.

Enlisted men: When I entered the Fleet, *before* the Crash of '29 and about a year before unemployment became a problem, Navy recruiting offices were turning down 19 out of 20 volunteers; the Army was turning down 5 out of 6. The reenlistment rate was high; the desertion rate almost too small to count.

Span of Time—Today in the Armed Forces

I have said repeatedly that I am opposed to conscription at any time, peace or war, for moral reasons beyond argument. For the rest of this I will try to keep my personal feelings out of the discussion—as I did in

the rosy picture painted above. I reported *facts*, not my emotions.

I will not review details showing that the USSR is today militarily stronger than we are as the matter has been discussed endlessly in news media, in Congress, and in professional journals. The public discussion today concedes the military superiority of the USSR and centers on *how much* they are ahead of us, and what should be done about it. The details of this debate are of supreme importance as **the most expensive thing in the world is a second-best military establishment**, good but not good enough to win. At the moment the three-cornered standoff is saving us from that silly way to die . . . but I cannot predict how long this stalemate will last as key factors are not under our control, and neither our government nor our citizens seem willing to accept guns instead of butter on the scale required to make us too strong for anyone to risk attacking us. Polls seem to show that a controlling number of voters think that we are already spending too much on our Armed Forces.

What I set forth below comes primarily from an article by Richard A. Gabriel, Associate Professor of Politics, St. Anselm's College, Manchester, New Hampshire, author of *CRISIS IN COMMAND*. I lack personal experience with Army conditions today but what Dr. Gabriel says about them matches what I have heard from other sources and what I have read (I belong to all three associations—Army, Navy, Air Force—plus the Naval Institute and the Retired Officers Association; I get much data secondhand but no longer see it with my own eyes, hear it with my own ears).

Readers with personal experience in Korea, Viet Nam, and in the Services anywhere since the end of the Viet Nam debacle, I urge to write and tell me what you know that I don't, especially on points in which I am seriously mistaken.

Summarized from "The Slow Dying of the Ameri-

can Army," Dr. Richard A. Gabriel in *Gallery* magazine, June 1979, p.41 et seq.:

Concerning the All Volunteer Force (AVF): Early this year the Pentagon admitted that all services had failed to meet quotas.

30% of all Army volunteers are discharged for offenses during first enlistment. Of the 70 per 100 left, 26 do not reenlist. The desertion rates are the highest in history . . . and this fact is partly covered up by using administrative discharges (—i.e., "You're fired!") rather than courts martial and punishment—if the deserter turns up. But no effort is made to find him.

According to Dr. Gabriel, citing General George S. Blanchard and others, hard-drug use (heroin, cocaine, angel dust—not marijuana) is greater than ever, especially in Europe, with estimates from a low of 10% to a high of 64%. Marijuana is ignored—but let me add that a man stoned out of his mind on grass is not one I want on my flank in combat.

Category 3B and 4 (ranging down from dull to mentally retarded) make up 59% of Army volunteers . . . in a day when privates handle very complex and sophisticated weapons and machinery. Add to this that the mix is changing so that a typical private might be Chicano or Puerto Rican, the typical sergeant a Black, the typical officer "Anglo." And that officers are transferred with great frequency and enlisted men with considerable frequency and you have a situation in which esprit de corps *cannot* be developed (an outfit without esprit de corps is not an army unit; it is an armed mob—R.A.H.).

Today we have more general officers than we did in World War Two. Our ratio of officers to enlisted men is more than twice as high as that of successful armies in the past. But an officer is not with his troops long enough to be "the Old Man"—he is a "manager," not a leader of men.

Dr. Gabriel concludes: "The most basic aspect is the need to reinstate the draft."

I disagree.

My disagreement is not on moral grounds. Forget that I ever voiced opposition to slave soldiers; think of me as Old Blood-and-Guts willing to use any means whatever to win.

Reinstating the draft would *not* get us out of trouble, even with the changes Dr. Gabriel suggests to make the draft "fair."

As everyone knows, we were in the frying pan; shifting to AVF, instead of producing an efficient professional army, put us into the fire. Dr. Gabriel urges that we climb back into the frying pan—but with improvements: a national lottery with no deferments whatever for any reason.

I can't disagree with the even-steven rule . . . but my reason for thinking that Dr. Gabriel's solution will not work is this:

A lottery, even meticulously fair, *cannot* make a man willing to charge a machine-gun nest in the face of almost certain death. That sort of drive comes from emotional sources: *Esprit de corps* and patriotism *cannot* be drawn in a lottery.

Conscription works (among free men) only when it is not needed. I have seen two world wars; we used the draft in each . . . but in each case it was a means of straightening out the manpower situation; it was *not* needed to make men fight. Both wars were popular.

Since then we have had two non-Wars—Korea and Nam—in "peacetime" and using conscript troops. **And each non-War was a scandalous disaster.**

I don't have a neat solution to offer. If the American people have lost their willingness to fight and die for their country, the defeat cannot be cured by conscription. Unless this emotional condition changes (and I do not know how to change it), we are whipped no matter what weapons we build. It could be overnight, or it could continue to be a long slow slide downhill over many years—ten, twenty, thirty. But the outcome is the same. Unless *something* renews the spirit this

country once had, we are in the terminal stages of decay; history is ending for us.

Our foreign masters might graciously let us keep our flag, even our national name. But "the Land of the Free and the Home of the Brave" will be dead.

Time Span—Inflation

The Winter of '23-'24 I paid a street vendor 5¢ for a five billion mark German note and I paid too much; 5,000,000,000 DM was worth a trifle over 1¢. A bit later it was worth nothing.

In 1955 at the foot of the Acropolis I bought a small marble replica of the Venus of Melos for 10,000 drachma. I wasn't cheated; that was 35¢ USA.

There are the British pound, the Turkish lira, the Italian lira, the Mexican peso, and several others; all mean one pound of silver. Look up "exchange" and "commodities" in your newspaper; grab your pocket calculator and see how much each is inflated.

When I was a child of four or five my brothers and I used great stacks of hundred-dollar bills as play money. Confederate—

After two centuries, "Not worth a continental," still means "worthless." Memory is long for the damage done by inflation.

Before paper "money" was invented, inflation was accomplished by adding base metal to silver and/or gold while retaining the name of the coin. By this means the Roman denarius was devalued to zero during the first three centuries A.D. But inflation did not start with Caesar Augustus. In the early days of the Republic before the Punic Wars the cash unit was the libra (libra = lb. — pound = 273 grams, or about 60% of our pound avoirdupois, 454 grams). That's too large a unit for daily retail use; it was divided into 12 unciae (ounces).

A "lb." of silver was called an "as." $\frac{1}{12}$ of that, struck as coinage, made efficient currency. Now comes war and inflation—

Eventually the "as"—once a pound of silver—was so debased that it amounted to a penny, more or less. Augustus, by decree, went back on a silver/gold standard and created the denarius, 3.87 grams of fine silver. He made 25 denarii equal in value to one aureus (7.74 grams of gold), or a ratio of 12.5 to one. ("Free and unlimited coinage of silver at a ratio of sixteen to one!" The Great Commoner and the august Emperor had similar notions about hard currency.)

One Augustan denarius equalled in gold at today's London fix (\$385/troy ounce) a nominal \$3.83, or about $\frac{3}{10}$ of a gram of gold. This tells us nothing about purchasing power; it simply says that the Augustan denarius was a solid silver coin almost the size and weight of the solid silver quarter we used to have before the government foisted on us those sandwich things. How much olive oil or meal that would buy in Rome around 1 A.D. can be estimated from surviving records—but all the gold in Rome could not buy an aspirin tablet or a paper of matches. No way to compare. And hard money was not supplemented by printed money, bank checks, and transactions that take place entirely inside computers—but I can't go into how those phenomena affect purchasing power without writing a book twice as long as this one on fiscal theory (which I am quite willing to do but nobody would buy it).

What Augustus did was to stabilize Rome's money by defining it in terms of two commodities, each intrinsically valuable, each stable in supply, each almost indestructible, and he defined also the legal ratio between the two coinages—an effort to circumvent Gresham's Law, unknown then but Augustus appears to have had a gut feeling for it. (Not Bill Gresham—the other one. Thomas Gresham.) But a bimetallic standard has its problems; the free economy ratio tends to drift away from the legal ratio, and Gresham's Law begins to work. But this happens very slowly with

hard money and is not the disaster that printing-press inflation is, or the debasing of hard money.

Caesar Augustus died in 14 A.D.

His corpse was hardly cold before the vultures got to work. Tiberius, Caligula, Claudius, Nero—even Claudius did nothing to stop the robbery. Titus attempted an Augustan return to honest money in 80 A.D. but he died in September the following year; his successor was a disaster even as Caesars go.

“Put not your trust in Princes.” Debasement of the currency continued under every Caesar for the next two centuries. Diocletian (reign: 294–305) inherited a worthless denarius; he returned Rome to the bimetallic standard at a level barely below that of Augustus. But he increased enormously the bureaucracy, instituted the harshest of taxation to pay for his “reforms,” and decreed price-fixing—which worked just as it always does.

On his retirement (not assassination[!]) debasement was resumed while taxes stayed high, and Rome was on the skids. The decline and fall of the denarius and of Rome paralleled each other.

I’m tempted to discuss France’s incredible inflation and collapse thereof during the French Revolution (and three more French inflations since then), and the inflations of several other countries in other centuries. But they are monotonously alike and differ from debasement primarily in the fact that the invention of paper “money” permits the corruption of legal tender to get utterly out of hand before the people notice it. In Germany in the early twenties people used to take wheelbarrows to the grocery store—not to fetch back groceries but to carry money to the grocer. But the early stages of disastrous inflation feel like “prosperity.” Wages and profits go up, old debts are easier to pay off, business booms.

It is not until later that most people notice that prices and taxes have gone up faster than wages and

profits, and that it is getting harder and harder to make ends meet.

There is a strong emotional feeling that "a dollar is a dollar." (Hitler called it, "Mark is Mark!") But you can reexamine it in terms of prices on bread, or how many minutes to earn a dollar. And don't forget taxes! If you aren't working at least the first three months of each year to pay taxes before you can keep one dollar for yourself, then you are on welfare, one way or another. You may not think you are taxed that much—paycheck deductions and hidden taxes are extracted under anesthesia. Try dividing the Federal Budget by the number of wage earners *not on the public payroll*, then take a stab at where you fit in. Don't forget the same process for state, county, and city. There are Makers, Takers, and Fakers, no fourth category, and today the Takers and the Fakers outnumber (and out-vote) the Makers.

Today it takes more dollars each year to service the National Debt than the total budget for the last and most expensive year of the Korean War. I am not going to state here the amount of our National Debt. If you have not heard it recently, you wouldn't believe me. If you don't know, telephone your Congressman and ask; he has a local office near you. If the telephone information service can't (won't) tell you, the city room of *any* newspaper does know his number.

Our National Debt will *never* be paid. We are beyond the point of no return. Inflation will continue and get worse . . . and the elderly on fixed incomes and the young adults trying to start families will continue to bear the brunt.

Every congressman, every senator, knows precisely what causes inflation . . . but can't (won't) support the drastic reforms to stop it because it could (and probably would) cost him his job. I have no solution and only once piece of advice:

Buy a wheelbarrow.

The Age of Unreason

Having been reared in the most bigoted of Bible Belt fundamentalism in which every word of the King James version of the Bible is the literal word of God—then having broken loose at thirteen when I first laid hands on **THE ORIGIN OF SPECIES** and **THE DESCENT OF MAN**—I should have been unsurprised by the anti-intellectual and anti-science ground swell in this country.

I knew that our American temperament, practical as sharp tools on one side, was never more than three quarters of an inch from mindless hysteria on the other side. I *knew* this—my first long story was **IF THIS GOES ON**—, a yarn based on the assumption that my compatriots were capable of throwing away their dearly-bought liberties to submit to a crude and ridiculous religious dictatorship.

(In forty years of letters about that story no one has ever criticized this assumption; I infer that I am not alone in believing it.)

I had read much about the Ku Klux Klan during the Tragic Era, talked with many who had experienced it, then experienced its nationwide recrudescence in the early 1920's. I had seen damfoolishness from dance marathons to flagpole sitters, and had made considerable study of crowd behavior and mass delusions. I had noted, rather casually, the initial slow growth of anti-science-&-intellect-ism.

Yet the durned thing shocked me.

Let me list some signs:

- a) I CHING;
- b) Back-to-nature cults;
- c) The collapse of basic education;
- d) The current respectability of natal horological astrology among "intelligentsia"—e.g. professors, N.Y. lit'rary people, etc.;

e) "Experts" on nuclear power and nuclear weapons who know nothing whatever of mathematical physics and are smug in admitting it;

f) "Experts" on the ecology of northern Alaska who have never been there and are not mathematically equipped to analyse a problem in ecology;

g) People who watch television several hours a day and derive all their opinions therefrom—and expound them;

h) People who watch television several hours a day;

i) The return of creationism — "Equal time for Yah-weh;"

j) The return of witchcraft.

The mindless yahoos, people who think linearly like a savage instead of inductively or deductively, and people who used to be respectful to learned opinion or at least kept quiet, now are aggressively on the attack. Facts and logic don't count; their intuition is the source of "truth."

If any item on the above list strikes you as rational, I won't debate it with you; you are part of the problem.

But I will illustrate what I mean in categories where I think I might be misunderstood.

a) **I CHING**—easier than "reading the augurs" but with nothing else to recommend it. Chinese fortune cookies are just as accurate—and you get to eat the cookie. Nevertheless this bit of oriental nonsense is treated with solemn seriousness by many "educated" people. It is popular enough to make profitable the sale of books, equipment, magazine articles, and personal instruction. Paralleling I CHING is the widespread use of Tarot cards. Fortunetelling by cards used to be a playful parlor game, a mating rite—a nubile girl limited by the vocabulary and public manners of the Mauve Decade could convey to a ratty young male almost any message by how she chose to "read his fortune"—with no impropriety. But neither he nor she took the cards seriously.

Tarot cards formerly were used only by Gypsy or

fake-Gypsy fortunetellers; they were not an article of commerce, were not easy to find. Today they are as easy to buy as liquor during prohibition, and also books on their "interpretation." Reading the Tarot is taken with deep seriousness by a dismaying number of people—having the Hanging Man turn up can cause great anguish.

b) **Back-to-nature cults:** I do *not* mean nudist resorts or "liberated" beaches. The growing realization that human bodies are not obscene is a sane, healthy counter trend in our crazy culture. By back-to-nature cults I mean people who band together to "return to the land" to grow their own food without pesticides, without artificial fertilizers, without power machinery, self-reliant in all ways . . . but with no comprehension that a spading fork implies coal mines, iron ore, blast furnaces, steel mills, factories, etc., that any building more complex than a log cabin or a sod house implies a building-materials industry, etc.

If all of us tried to go back-to-nature, most of us would starve rather quickly. These back-to-nature freaks can't do arithmetic.

c) **The collapse of basic education**—no need to repeat.

d) **Natal horological astrology**—Baseline: fifty-odd years ago astrology was commonly regarded as a ridiculous *former* superstition, one all but a tiny minority had outgrown. It is now the orthodoxy of many, possibly a majority. This pathological change parallels the decay of public education.

Stipulated: Ancient astrologers were scientists in being able to predict certain aspects of descriptive astronomy such as eclipses, positions of the sun, moon, and naked-eye planets, etc. Whether or not they believed the fortunetelling they supplied to their kings, patrons, or clients is irrelevant. The test of a science is its ability to predict; in the cited phenomena the Chaldean priests (for example) performed remarkable feats of prediction with handcrafted naked-eye instruments.

It has long been known that Sol is the heat engine that controls our weather. Recently, with the discovery of solar wind, the Van Allen belts, et al., we have become aware of previously unsuspected variables affecting us and our weather, and successful predictions are being made empirically—no satisfactory theory.

“What sign were you born under?”—I don’t recall having heard that question until sometime after World War Two. Today it is almost impossible to attend a social gathering (including parties made up almost solely of university staff and spouses) without being asked that question or hearing it asked of someone else.

Today natal horological astrology is so widely accepted that those who believe in it take it for granted that anyone they meet believes in it, too—if you don’t, you’re some sort of a nut. I don’t know what percentage of the population believe in natal horological astrology (sorry about that clumsy expression but I wish to limit this precisely to the notion that the exact time, date, latitude, and longitude of your birth and the pattern of the Sun, Moon, and planets with respect to the Zodiac at that exact time all constitute a factor affecting your life comparable in importance to your genetic inheritance and your rearing and education)—I don’t know the percentage of True Believers but it is high enough that newspaper editors will omit any feature or secondary news rather than leave out the daily horoscope.

Or possibly *more* important than heredity and environment in the minds of True Believers since it is seriously alleged that this natal heavenly pattern *affects every day of your life*—good days for new business ventures—a bad day to start a trip—and so forth, endlessly.

The test of a science is its capacity to make correct predictions. Possibly the most respected astrologer in America is a lady who not only has her daily column in most of the largest newspapers but also annually publishes predictions for the coming year.

For ten years I clipped her annual predictions, filed them. She is highly recommended and I think she is sincere; I intended to give her every possible benefit of doubt.

I hold in my hand her predictions for 1974 dated Sunday January 13, 1974:

Here are some highlights: "... Nixon ... will ride out the Watergate storm ... will survive both the impeachment ordeal and the pressures to resign ... will go down in history as a great president ... will fix the responsibility for Pearl Harbor" (vindicating Kimmel and Short) ... "in ... 1978 ... the cure for cancer will be acknowledged by the medical world ... end the long search." (1974) "The dollar will be enormously strengthened as the balance of payments reflects the self-sufficiency in oil production." "The trouble in Ireland will continue to be a tragic situation *until 1978.*" (Italics added—R.A.H.) "Willy Brandt" (will be reelected) "and be in office for quite some time to come. He will go on to fantastic recognition about the middle of 1978." (On 6 May 1974 Brandt resigned during a spy scandal.) She makes many other predictions either too far in the future to check or too vaguely worded. I have omitted her many predictions about Gerald Ford because they all depend on his serving out the term as vice president.

You can check the above in the files of most large newspapers.

e) & f)—no comment needed.

g) & h) need no comment except to note that they are overlapping but not identical categories—and I should add "People who allow their children to watch television several hours a day." (Television, like the automobile, is a development widely predicted ... but its major consequences *never* predicted.)

i) **The return of creationism**—If it suits you to believe that Yahweh created the universe in the fashion related in Genesis, I won't argue it. But I don't have to respect your belief and I do not think that legislation requiring that the Biblical version be included in pub-

lic school textbooks is either constitutional or fair. How about Ormuzd? Ouranos? Odin? There is an unnumbered throng of religions, each with its creation myth—all different. Shall one of them be taught as having the status of a scientific hypothesis merely because the members of the religion subscribing to it can drum up a majority at the polls, or organize a pressure group at a state capital? This is tyranny by the mob inflicted on minorities in defiance of the Bill of Rights.

Revelation has no place in a science textbook; it belongs under religious studies. Cosmogony is the most difficult and least satisfactory branch of astronomy; cosmologists would be the first to agree. But, damn it; they're *trying!*—on the evidence as it becomes available, by logical methodology, and their hypotheses are constantly subjected to pitiless criticism by their informed equals.

They should not have to surrender time on their platform, space in their textbooks, to purveyors of ancient myths supported only by a claim of "divine revelation."

If almost everyone believed in Yahweh and Genesis, and less than one in a million U.S. citizens believe in Brahma the Creator, it would not change the constitutional aspect. *Neither* belongs in a science textbook in a tax-supported school. But if Yahweh is there, Brahma should be. And how about that Eskimo Creator with the unusually unsavory methods? We have a large number of Eskimo citizens.

j) **The return of witchcraft**—It used to be assumed that Southern California had almost a monopoly on cults. No longer. (Cult vs. religion—I am indebted to L. Sprague de Camp for this definition of the difference. A "religion" is a faith one is born into; a "cult" is a faith an adult joins voluntarily. "Cult" is often used as a slur by a member of an older faith to disparage a newer faith. But this quickly leads to contradictions. In the 1st century A.D. the Christians were an upstart cult both to the Sanhedrin and to the Roman priests.

"Cult" is also used as a slur on a faith with "weird ideas" and "weird practices." But this can cause you to bite your tail even more quickly than the other. "Weird" by whose standards?

(Mr. de Camp's distinction implies something about a mature and presumably sane adult becoming a proselyte in a major and long-established faith, such as Islam or Shintoism or the Church of England . . . but the important thing it implies is that a person born into, let us say, the Presbyterian Church is not being odd or unreasonable if he remains in it all his life despite having lost all faith; he's merely being pragmatic. His wife and kids are there; he feels that church is a good influence on the kids, many of his friends are there. It's a comfortable habit, one carrying with it a degree of prestige in the community.

(But if he changes into a saffron robe and shaves his pate, then goes dancing down the street, shouting, "Hare Krishna!" he won't keep his Chevrolet dealership very long. Theology has nothing to do with it.)

One of the symptoms of this Age of Unreason, anti-science and anti-intellect, in the United States is the very prominent increase in new cults. We've never been without them. 19th Century New England used to breed them like flies. Then it was Southern California's turn. Now they seem to spring up anywhere and also are readily imported from abroad. Zen Buddhism has been here so long that it is usually treated with respect . . . but still so short a time (1950) that few American adults not of Japanese ancestry can claim to have been born into it. Ancient in Japan, it is still a cult *here*—e.g., Alan Watts (1915 – 1973), who moved from Roman Catholic priest to Episcopal priest to Zen priest. I doubt that there is any count on American Zen Buddhists but it is significant that both "satori" and "koan" were assimilated words in all four standard U.S. dictionaries only 16 years after Zen Buddhism penetrated the non-Japanese population.

And there are the Moonies and the Church of Scien-

tology and that strange group that went to South America and committed suicide en masse and the followers of that fat boy from India and—look around you. Check your telephone book. *I express no opinion on the tenets of any of these*; I simply note that, since World War Two, Americans have been leaving their “orthodox” churches in droves and joining churches new in this country.

Witchcraft is not new and never quite died out. But it is effectively new to most of its adherents here today because of the enormous increase in numbers of witches. (“Warlock” is insulting, “Wizard” barely acceptable and considered gauche, “Witch” is the correct term both male and female. The religion is usually called either “the Old Religion” or “the Craft” rather than witchcraft.)

The Craft is by its nature underground; witches cannot forget the hangings in Salem, the burnings in Germany, the fact that the injunction, “Thou shalt not suffer a witch to live” (Exodus XXII, 18) has usually been carried out whenever the Old Religion surfaced. Even during this resurgence only four covens have come to my attention and, not being a witch myself, I have never attended an esbat (easier to enter a tyled lodge!).

The Craft is *not* Devil worship and it is *not* Black Mass but both of the latter have enjoyed some increase in recent years.

If witchcraft has not come to your attention, search any large book store; note how very many new titles concern witchcraft. Most of these books are phony, not written by witches, mere exploitation books—but their very existence shows the change. Continue to show interest and a witch just might halfway reveal himself by saying, “Don’t bother with that one. Try this one.” Treat him with warm politeness and you may learn much more.

To my great surprise when I learned of it, there are over a dozen (how much over a dozen I have no way to

guess) periodicals in this country devoted solely to the Old Religion.

Time Span—The Cancerous Explosion of Government

Will Rogers told us that we were lucky in that we didn't get as much government as we pay for. He was (and is) emphatically right . . . but he died 15 August 1935. The Federal government spent \$6,400,000,000 in the last 12 months of his tragically short life. The year he was born (1879) the Federal government spent \$274,000,000—an expensive year, as we resumed paying specie for the Greenback Inflation, \$346,700,000 of fiat money.

What would Will Rogers think of a budget of \$300 billion and up?

(Figures quoted from THE STATISTICAL HISTORY OF THE UNITED STATES,

Prepared by the U.S. Bureau of the Census)

<i>Census Year</i>	<i>Population</i>	<i>Fed. Employees State & Local Total Pub. Emp.</i>	<i>Fed. Receipts Fed. Expenditure Surplus/Deficit</i>	<i>Fed. Public Debt</i>
1910	91,972,266	388,708 ?	\$675,512,000 693,617,000 (-) \$18,105,000	\$1,146,940,000
1920	105,710,620	655,265 ?	\$6,648,898,000 6,357,677,000 \$291,221,000	\$24,299,321,000
1930	122,755,046	601,319 2,622,000 3,223,319	\$4,057,884,000 3,320,211,000 \$737,673,000	\$16,185,310,000
1940	131,669,275	1,042,420 3,206,000 4,248,420	\$6,900,000,000 9,600,000,000 (-) \$2,700,000,000	\$50,700,000,000
1950	150,697,361	1,960,708 4,098,000 6,058,708	\$40,900,000,000 43,100,000,000 (-) \$2,200,000,000	\$256,900,000,000
1960	178,464,236	2,398,704 6,083,000 8,481,704	\$92,500,000,000 92,200,000,000 \$300,000,000	\$290,900,000,000
1970	203,235,298	2,981,574 9,830,000 12,811,574	\$193,700,000,000 196,600,000,000 (-) \$2,900,000,000	\$382,600,000,000
1980	(222,000,000)	(3,600,000) (14,500,000) (18,100,000)	(\$300,000,000,000) (\$310,000,000,000) (-) (\$10,000,000,000)	(\$525,000,000,000)

(1980 figures are extrapolations = wild guesses) (Too timid?) *Much* too timid!—as you knew when you read them, as I knew when I prepared them. I plotted all of the above figures on graph paper, faired the curves, *suppressed what I knew by memory* (even refrained from consulting World Almanacs to bridge the 9 years since the close of compilation of THE STATISTICAL HISTORY) and extrapolated to 1980 by the curves—not tangent, but on the indicated curve.

By the best figures I can get from Washington today (20 Nov 1979) the budget is \$547,600,000,000; the expected deficit is \$29,800,000,000; and our current Federal Public Debt is estimated at \$886,480,000,000.(!!!)

The end of the Federal fiscal year, September 30, is still over ten months away. In ten months a lot of things can happen. Unexpected events always cause unexpected expense . . . but with great good luck the deficit will not increase much and the National Public Debt will stay under \$900,000,000,000.

In case of war, all bets are off.

What is happening is what always happens in fiat-currency inflation: After a certain point, unpredictable as to date because of uncountable human variables, it becomes uncontrollable and the currency becomes worthless. Dictatorship usually follows. From there on anything can happen—all bad.

The Greenback Inflation did *not* result in collapse of the dollar and of constitutional government because gold backing was not disavowed, simply postponed for a relatively short time. The Greenback Party wanted to go on printing paper money, never resume specie payment—but eventually we toughed it out and paid hard money for the Greenbacks that had financed the Union side of the war. From 1862 to 1879 gold and silver were not used internally. Our unfavorable balance of trade for 1861–65, which *had* to be met in gold, was \$296,000,000. Hard times and high taxes—but we made it.

The French Revolution inflation was unsecured. Between April 1790 and February 1796, 40 billion livres or francs were issued. New paper money (Mandats) replaced them that year; the following year both sorts were declared no longer legal tender (waste paper!)—and 2 years later Napoleon took over “to save the Republic.”(!)

We could still keep from going utterly bankrupt by going back on some hard standard (gold, silver, uranium, mercury, bushels of wheat—*something*). But it would not be easy, it would not be popular; it would mean hard times for everyone while we recovered from an almighty hangover. Do you think a Congress and a President can be elected on any such platform?

One chink in the armor of any democracy is that, when the Plebs discover that they can vote themselves Bread & Circuses, they usually do . . . right up to the day there is neither bread nor circuses. At that point they often start lynching the senators, congressmen, bankers, tax collectors, Jews, grocers, foreigners, any minority—take your choice. For they know that *they* didn't do it. The citizen is sovereign until it comes to accepting blame for his sovereign acts—then he demands a scapegoat.

I used official figures without comment to show where we have been the past 70 years . . . and how we got into the mess we are in. But, while I think our government is more nearly honest than some others (see *INSIDE INTOURIST* Afterword, page 439), there is a lot of hanky-panky in those official figures. Example: Social Security taxes go into the general fund and are spent. If Social Security were *in fact* insurance (the basis on which the gimmick was sold to us by FDR's “New Deal”), the receipts would be segregated and invested and not shown as income . . . *OR* a competent insurance actuary with staff would calculate the commitment and it would show in the National Public Debt.

(The fact that a debt is amortized over the years

doesn't stop it from being a debt. It was an amortized mortgage that got me into this racket. The prospect of years and years of future monthly payments spoiled my sleep.)

The only way the Government can go on paying Social "Security" to my generation is by taxing you young people more and more heavily . . . and each year there are more and more old people and fewer and fewer young people. It won't help to run the printing presses faster; that causes food to rise in price, rents to go up, etc.—and people over 65 start putting pressure on Congress . . . and there's an election coming up. (There's *always* an election coming up.)

One thing I learned as a wardheeler was that (with scarce exceptions) people in my age group want one of two things: 1) They want to keep on clipping those coupons and collecting those rents and they don't give a damn what it does to the country, or 2) they want that raise in Social Security (Townsend Plan) ("Ham & Eggs") (you name one) and they don't give a damn what it does to the country.

(I don't claim to be altruistic. Just this pragmatic difference: I am sharply aware that, if the United States goes down the chute, *I* go down with it.)

I use the term "*Federal Public Debt*" because what is usually termed the "Public Debt" is by no means our total public debt. There are also state, county, city, and special-district debts. It is difficult to get accurate figures on these public debts but the total appears to be larger than the Federal Public Debt. I can't make even a wild guess at the Social Security commitment . . . but our *total* public promises-to-pay have to exceed two trillion dollars. How much is a trillion? Well, it means that a baby born today owes at least \$4,347.83 to the Federal Government alone before his eyes open. (No wonder he yells). It means that the Zero Population Growth family (who was going to save us all—remember?) of father, mother, and 2.1 children

owes \$17,826 in addition to private debts (mortgage, automobile, college for 2.1 children).

Of course papa won't pay it off; that debt will grow larger. But it will cost him \$2000 a year (and rising) just to "service" his pro-rata; any taxes for which he gets *anything at all*—even more laws—is on top of that.

A trillion seconds is 31,688 years, 9 months, 5 days, 8 hours, 6 minutes, and 42 seconds—long enough for the precession of the equinoxes to make Vega the Pole Star, swing back again to Polaris, and go on past to Alpha Cephei. Or counting the other way it would take us to 29,708 B.C. . . . or more than 25 thousand years before Creation by Bishop Usher's chronology for creationism.

I don't understand a trillion dollars any better than I do a trillion seconds. I simply know that we had better stop spending money we don't have if we want to avoid that Man on Horseback.

But I don't think we will stop "deficit financing," the euphemism that sounds so much better than "kiting checks."

You may have noticed that 1970 figure for public employees (not my extrapolation for 1980, but the official 1970 figures straight from the United States Bureau of the Census).

That figure does not include the Armed Forces. It does not include some special categories. It is easier to learn the number of slaves imported in 1769 (6,736) than it is to find out exactly how many people are on public payrolls in this country. And it is not simply difficult but *impossible* to determine how many people receive Federal checks for which they perform no services. (Or food stamps. Are food stamps money?) But one thing is certain: the number of people eligible to vote who *do* receive money from some unit of government (aid to dependent children, Supreme Court justices, not growing wheat, removing garbage, governors of states, whoever) exceeds the number eligible to vote

but receiving no pay or subsidy of any sort from any unit of government.

Have you read the Federal Register lately? Have you *ever* read the Federal Register? Under powers delegated by Congress certain *appointed* officials can publish a new regulation in the Federal Register and, if Congress does not stop it, after a prescribed waiting time, that regulation has the force of law—it *is* law, to you and to me, although a lawyer sees nuances. I have vastly oversimplified this description, but my only purpose is to point out that “administrative law” reaches into every corner of our lives, and is the major factor in the enormous and strangling invasion of the Federal Government into our private affairs.

I can’t see anything in the Constitution that permits the Congress to delegate its power to pass laws . . . but the Supreme Court says it’s okay and that makes my opinion worthless.

I’m stopping. There are endless other gloomy things to discuss—the oil shortage, the power shortage (not the same thing), pollution, population pressure, a projected change in climate that can and probably will turn the problems of population and food into sudden and extreme crisis, crime in the streets and bankrupt cities, our incredible plunge from the most respected nation on Earth to the most despised (but we are nonetheless expected to pick up the tab). Bill Gresham was right but he told only half of it: you not only don’t get rich peddling gloom; it isn’t any fun.

So now come with me—

“OVER THE RAINBOW—”

The new President had not been in office ten days before it became clear to his own party as well as to

the "loyal opposition" that he was even more of a disaster than the defeated candidate had predicted. Nevertheless the country was shocked when he served even fewer days than the ninth President—killed in a crash, his private plane, himself at the controls; dying with him his three top aides: White House chief of staff, press secretary, appointments secretary.

No U.S. or Canadian news medium said a word about alcohol or incidents in the dead President's past; they treated it as a tragic accident. Papers and TV reporters elsewhere were not as reticent.

The Speaker of the new House saw the ex-Vice President first (even before the oath of office) as the Speaker's seniority in line of succession enabled him to do. He came right to the point. "I am ready to take this load off your shoulders. We both know that you were picked simply to support the ticket; no one ever expected to load you down with *this*. Here's how we'll do it: You resign at once, then we'll meet the press together—after I'm sworn in. I'll do most of the talking. I promise you, it won't be a strain on you."

"I'm sure that it won't be. You're excused."

"*Huh!*"

"You may leave. In fact I am telling you to leave. I thought you had come to stand beside me as I take the oath . . . but you have something entirely different in mind. You would not enjoy staying; I would not enjoy having you stay."

"You'll regret this! You're making a mistake!"

"If a mistake was made, it was made at the Convention. By you and five others, I believe; I was not present. Yes, I may regret it but this is what I undertook to do when I accepted the nomination for the Vice-Presidency. Now get out. *Pronto!*"

The new President sent for the Director of the Budget forty minutes after the swearing in. "Explain this to me."

The Director hemmed and hawed and tried to say that the budget was too technical for anyone not in public life before—

—and was answered, "I'm accepting your resignation. Send in your deputy."

It was almost a week before this call was made: "Admiral? This is the President. If I come to your home, do you feel well enough to see me?"

There was a tussle of wills that the Admiral won only through pointing out that it was never proper to subject the President of the United States to unnecessary risk of assassination . . . and that with his new car, fitted for his wheelchair, he still went to the Pentagon twice a week. "I'm old, I admit; I was born in 1900. But I'm not dead and I'm quite able to report to my Commander in Chief. And we both know that threats have been made."

The President won the next argument. On being wheeled in the Admiral started to get out of his chair. "Do please sit down!"

The old man continued to try to rise, leaning on the arm of his nurse. The President said quickly, "That was expressed as a request but was an order. Sit down."

The Admiral promptly sat back down, caught his breath and said formally, "Ma'am, I report—with great pleasure!—to the President of the United States."

"Thank you for coming, sir. In view of our respective ages . . . and your health, I felt that it was a time to dispense with protocol. But you are right; there are indeed a flood of threats, many more than get into the news. I don't intend to be a target . . . at least until we have a new Vice President sworn in."

"Never be a target, Madam. You would be mourned by everyone, both parties. Uh, if I may say so, you are even more beautiful in person than you are on the screen."

"Not mourned by everyone, I'm certain, or I would not have to be cautious about assassination. As for that other, I'm not beautiful and you know it. I know what

I have. I project. But it's not physical beauty. It's something that a pro—a professionally competent actress—does with her whole being. Her voice, her expression, her hands, her body. A gestalt, with regular features the least important factor. Or not present, as with me."

The President smiled, got up and went around the big desk, leaned over the Admiral, kissed his forehead. "But you are an old dear to have said it."

He cleared his throat, noisily. "Ma'am, what is your opinion in the matter against that of millions of men?"

"We've dropped that subject. Now to work! Admiral, why is it that there has been so much difficulty with nuclear power plants ashore but never any trouble with your nuclear submarines?"

The President slapped her desk, glared at the leader of the delegation. "Stop that! Han'kerchief head, you've come to the wrong church. In this office there are *no* Blacks—or Blues, Whites, Greens, or Yellows—just Americans. Besides that, you claim to be a Black representing Blacks. Hmmp! That's a phony claim if I ever—"

"I resent that, Mrs. Ni—"

"*Pipe down!* 'Madam President,' if you please. And one does *not* interrupt the President. I said your claim was phony. It is. I'm at least three shades darker than you are . . . yet I'm smooth brown, not black." She looked around. "I don't see a real sooty black in your whole delegation. Mmm, I see just one darker than I am. Mr. Green, isn't it? That is your name?"

"Yes, Madam President. From Brooklyn."

"Any white blood, Mr. Green? Perhaps I should say 'Any Caucasian ancestry?'"

"Possibly. But none that I know of, Ma'am."

"We're all in that boat . . . including all whites. A person who claims to be absolutely certain of his ancestry more than three generations back is accepting

the short end of a bet. But since you are from Brooklyn, you can help me pass a word. An important word, one that I'll be emphasizing on the networks tonight, but I'll need help from a lot of people to let *all* the people know that I mean it. A Black who gets elected from Brooklyn has lots of Jewish friends, people who trust him."

"That's right, Madam President."

"Listen to my talk tonight, then pass it on in your own words. This nation has split itself into at least a hundred splinter groups, pressure groups, each trying for a bigger bite of the pie. That's got to *stop*!—before it kills us. No more Black Americans. No more Japanese Americans. Israel is not our country and neither is Ireland. A group calling itself La Raza had better mean the human race—the *whole* human race—or they'll get the same treatment from me as the Ku Klux Klan. Amerindians looking for special favors will have just two choices: Either come out and *be* Americans and accept the responsibilities of citizenship . . . or go back to the reservation and shut up. Some of their ancestors got a rough deal. But so did yours and so did mine. There are no Anglos left alive who were at Wounded Knee or Little Big Horn, so it's time to shut up about it.

"But race and skin color and national ancestry isn't all that I mean. I intend to refuse to see *any* splinter group claiming to deserve special treatment not accorded other citizens and I will veto any legislation perverted to that end. Wheat farmers. Bankrupt corporations. Bankrupt cities. Labor leaders claiming to represent 'the workers' . . . when most of the people they claim to represent repudiate any such leadership. Business leaders just as phony. *Anyone* who wants the deck stacked in his favor because, somehow, he's 'special.' "

The President took a deep breath, went on: "Any such group gets thrown out. But two groups will get

thrown out so hard they'll bounce! I'm a woman and I'm Negro. We've wiped the Jim-Crow laws off the books; I'll veto any Crow-Jim bill that reaches this office. Discrimination? Certainly there is still discrimination—but you can't kill prejudice by passing a law. We'll make it by how we behave and what we produce—not by trick laws.

"I feel even more strongly about women. We women are a majority, by so many millions that in an election it would be called a landslide. And *will* be a landslide, on *anything*, any time women really want it to be. So women don't need favors; they just need to make up their minds what they want—then take it." The President stood up again. "That's all. I'm going to devote this term to those 'unalienable rights'—for *everybody*. No splinter groups. Go tell people so. Now git . . . and don't come back! Not as a splinter group. Come back as *Americans*."

They moved toward the door. Their erstwhile leader muttered something. The President demanded, "Mr. Chairman, what did you say?"

"I said," he answered loudly, "you aren't going to have a second term."

She laughed at him. "I thought that's what I heard. Burr head, I'm not worrying about being reelected; I worry only about how much I can do in four years."

(Editorial in the Springfield *Eagle*)

LIFE INSURANCE?

The President's surprise nomination of the House Minority Leader for the vacant vice-presidency has produced some snide theories, one of the nastiest

being the idea that she fears a plot on her life by the wheeler-dealers who put the late President into office, so she is spiking their guns (literally!) by rigging things to turn the presidency over to the opposition party should anything happen to her. . . .

. . . prefer to take her at her word, that her objective is to get the country unified again, and that a woman and a man, a Republican and a Democrat, a White and a Black, could be the team to do it.

The Speaker of the House has still not commented, but his floor leader and the nominated minority leader appeared with the President when she announced her choice. The Senate President Pro Tempore said, "I see no reason why confirmation should not go through quickly. I've known Don for thirty years; I trust that I am not so narrow-minded that I can't recognize presidential caliber in a man of another party. . . .

. . . customary to be of the same party, there is a custom just as long standing (and more important) that a President have a Vice President he (she) trusts to carry out his (her) policies.

Let's back them to the limit! Let's all be *Americans* again!

"Thanks for coming."

"Madam President, any time you send a car for me, then scoot me across the country in a hypersonic military jet, thanks should be the other way. My first experience above the speed of sound—and my first time in the Oval Office. I never expected to be in it."

She chuckled. "Nor did I. Especially on this side of this desk. Let's get to work." She held up a book. "Recognize this?"

"Eh?" He looked startled. "Yes, Ma'am, I do. I should."

"You should, yes." She opened to a marked page, read aloud: "'—I have learned this about engineers. When something *must* be done, engineers can find a way that is economically feasible.' Is that true?"

"I think so, Ma'am."

"You're an engineer."

"I am an *obsolete* engineer, Ma'am."

"I don't expect you to do the job yourself. You know what I did about fusion power plants."

"You sent for the one man with a perfect record. I've seen the power ship moored off Point Sur. Brilliant. Solved an engineering and a public relations problem simultaneously."

"Not quite what I mean. I consulted the Admiral, yes. But the job was done by his first deputy, the officer he has groomed to replace him. And by some other Navy people. Now we're working on ways to make the key fission-power people—safety control especially—all former Navy nuclear submariners. But we have to do it without stripping the Navy of their Blue and Gold crews. On things I know nothing about—most things, for this job! I consult someone who *does*—and that leads me to the person who can do it. Since I know very little about how to be President, I look for advice on almost everything."

"Ma'am, it seems to me—and a lot of other people—that you were born for the job."

"Hardly. Oh, politics isn't strange to me; my father held office when I was still a girl at home. But I did my first television commercial at fourteen and I was hooked. If I hadn't been 'resting' between contracts, I would not have had accepted the Governor's appointment—I was just his 'exhibit coon' but the Commission's work did interest me. Then I was still an 'exhibit coon' when he saw to it that I was on his favorite-son slate. Then, when the three leading candidates deadlocked, my late predecessor broke the deadlock in his favor by naming me as the other half of his ticket. I went along with it with a wry grin inside, figuring, first, that the ploy wouldn't work, and second, that, if he *did* get nominated, he would find some way to wiggle out—ask me to withdraw in favor of his leading rival or some such."

She shrugged. "But he didn't—or couldn't. I don't know which; he rarely talked to me. Real talk, I mean. Not just, 'Good morning,' and, 'Did you have a comfortable flight' and not wait for an answer.

"I didn't care. I relished every minute of the campaign. An actress sometimes plays a queen . . . but for four months I got to *be* one. Never dreaming that our ticket would win. I knew what a—No, *de mortuis nil nisi bonum*, and we must get back to work. What would you do about pollution of streams?"

"Eh? But that one has already been solved. By one of the Scandinavian countries, I believe. You simply require every user to place his intake immediately downstream from his discharge of effluent into the stream. In self-protection the user cleans up his discharge. It's self-enforcing. No need to test the water until someone downstream complains. Seldom. Because it has negative feedback. Ma'am, complying with a law should be more rewarding than breaking it—or you get positive feedback."

She made a note. "We could clean up the Mississippi that way. But I'm fretted about streams inside states, too. For example, the Missouri, where it is largest, is entirely inside the State of Missouri."

"Ma'am, I think you'll find that you have jurisdiction over *all* navigable streams."

"I do?"

"Ma'am, you have powers you may never have dreamed existed. A 'navigable stream' is one only three feet deep, I think. You may right now have the power to order this under law already on the books. If there is a paragraph or even a clause on placement of inlets and outlets, you almost certainly can issue an executive order right away. Today. The boss of the U.S. Engineers would know. General Somebody. A French name."

She touched a switch. "Get me the head of the U.S. Engineers. How would you dispose of nuclear power plant wastes? Rocket them onto the Moon as someone

urged last week? Why wouldn't the Sun be better? We may want to go back to the Moon someday."

"Oh, my, no! Neither one, Ma'am."

"Why not? Some of those byproducts are poisonous for hundreds of years, so I've heard. No?"

"You heard correctly. But the really rough ones have short half-lives. The ones with long half-lives—hundreds, even thousands of years, or longer—are simple to handle. But don't throw away *any* of it, Ma'am. Not where you can't recover it easily."

"Why not? We're speaking of *wastes*. I assume that we have extracted anything we can use."

"Yes, Ma'am, anything *we* can use. But our great grandchildren are going to hate you. Do you know the only use the ancient Romans had for petroleum? Medicine, that's all. *I* don't know how those isotopic wastes will be used next century . . . any more than those old Romans could guess how *very* important oil would become. But I certainly wouldn't throw those so-called wastes into the Sun! Besides, rockets do fail . . . and who wants to scatter radioactives over a couple of states? And there's the matter of the fuel and steel and a dozen other expensive things for the rockets. You could easily wind up spending more money to get rid of the ashes than you ever got from selling the power."

"Then what *do* you do? They say we mustn't sink it into the ocean. Or put it on the Antarctic ice cap. Salt mines?"

"Madam President, honest so help me, this is one of those nonproblems that the antitechnology nuts delight in. Radioactive wastes aren't any harder to handle than garbage. Or hot ashes. Or anything else you don't want to pick up in your bare hands. The quantity isn't much, not at all like garbage, or coal ashes. There are at least a half dozen easy ways. One of the easiest is to mix them with sand and gravel and cement into concrete bricks, then stack them in any unused piece of desert.

"Or glass bricks. Or let the stuff dry and store it in steel barrels such as oil drums and use those old salt mines you mentioned—the bricks you could leave in the open. All by remote manipulation, of course; that's the way a radioactives engineer does everything. Waldoes. That's old stuff. No trouble."

"I thought you said you were obsolete."

He grinned sheepishly. "Ma'am, it's easy to talk. As long as I know that young fellows will have to do the tedious drudgery that goes into making anything new work. But the solutions I've offered *are* practical. No new discoveries needed."

"How about air pollution?"

"What sorts, Ma'am? The two main sources are internal combustion engines—trucks and autos—and industrial smokes. Quite different problems."

"Pick one."

"Transportation pollution is going to solve itself soon—either the hard way or the easy way. Oil, whether it's our own or from the OPEC, is too valuable to be burned in cars and trucks; it's the backbone of the chemical engineering industry—fertilizers, plastics, pesticides, lubricants, and so forth. So, quite aside from the energy problem, we need to stop burning it. We can either wait until it's forced on us catastrophically . . . or we can turn to other transportation power voluntarily, and thereby become self-sufficient in oil for peace or for war. Either way, transportation pollution is ended."

"But *what* other transportation power, Doctor?"

"Oh. Half a dozen ways, at least. Get rid of the I.C. engine completely, both Otto cycle and Diesel cycle, and go back to the external combustion engine and steam. The I.C. engine never did make sense; starting and stopping combustion every split second is a guarantee of incomplete combustion, wasted fuel, and smog. Air pollution. External combustion has no such built-in stupidity; no matter what fuel, it burns con-

tinuously and can be adjusted for complete combustion. The Stanley Steamer used kerosene. But that's petroleum again. I would use wood alcohol as a starter—it hurts me every time I pass a sawmill and see them burning chips and slash.

"But wood alcohol has its drawbacks. We may burn hydrogen someday. Or learn to store electricity in less weight and less space. Or store energy in a flywheel. But all of those, even hydrogen, are simply ways to store energy. It still leaves an energy problem."

"Hydrogen, too? But you said we would burn it. No?"

"We'll burn it for some purposes; in some ways it's the ideal fuel; its only ash is water vapor. But, Ma'am, we don't *have* hydrogen; we have *water*—and even with perfect efficiency—never achieved—the energy you get out of hydrogen by burning it cannot exceed the energy you must use in getting that hydrogen by electrolysis of water. So you must generate electricity first."

"I see. No free lunch."

"Never a free lunch. But the energy problem can be solved several ways . . . through renewable resources. We've been using nonrenewable resources—coal and oil and cutting trees faster than they grow."

"Renewable resources—Windmills and water power and sun power?"

"Wind and water power are fine but limited. I mean effectively unlimited power. Such as this new wrinkle of thermoelectric power from the temperature difference of deep ocean and surface ocean. But there aren't too many really convenient places to do that. You named the one energy that is unlimited and convenient anywhere. Sun power."

"So? What desert is convenient to the Gary steel mills?"

"Not desert, Ma'am; the Sierra Club wouldn't like it."

"I plan to tell the Sierra Club that they are *not* the government of the United States. But in stronger language."

"I look forward to hearing you, Madam President. The Sierra Club loves deserts and hates people. But our deserts aren't sufficient. Sun power, yes—but *unlimited* sun power. In orbit."

South Africa Enraged

**United States Surprise Return
to Gold Standard at \$350 per
Troy Ounce of Fine Gold Has
Bourses in Turmoil**

**"New Policy Obvious Concomitant of
Return to Balanced Budget," Says
Treasury Secretary Spokesman**

"The Way to Resume is to Resume."

By ADAM SMITH
Finance Editor

WASHINGTON—The Treasury Secretary, after reading aloud to the Press the President's brief announcement of resumption of specie payments immediately at \$350/oz., emphasized that this was not a tactical maneuver to "strengthen the dollar," not an auction of bullion such as those in the past, but a permanent policy consistent with the administration's total policy. "A return to our traditional policy, I must add. A century ago, for 15 years, war caused us to suspend specie payments—but never with any intent to accept the vice of fiat money. Since 1971, as sequelae to 3 wars, we have had a similar problem. By letting the dollar float until the world price of gold in terms of dollars settled down, we have determined what could be called the natural price. So we have resumed specie payment at a firm gold standard. God willing, we will never leave it."

This was in answer to the London *Times* correspondent's

frosty inquiry as to whether or not the Secretary thought anyone would want our gold at that price. The Treasury Secretary told him that we were not "selling gold" but promising to redeem our paper money at a gold-standard price. The *Times'* question was inspired by the fact that at the close of market Friday the London fix was \$423.195 per troy ounce, with the Zurich fix, the Winnipeg fix, and the Hong Kong fix (the last only hours before the Washington announcement) all within a dollar of the London fix.

PRAVDA: "—capitalistic trickery—"

Moscow has not had a free market in gold since pre-1914 but, as a gold-producing country, its response to our resumption policy has been even more acid than the shrill complaints from Johannesburg. The Zurich gold market did not open today. London opened on time but the price dropped at once, with the first purchase at \$397.127, which slowed but did not stop the decline. Winnipeg opened an hour late; the reason became clear when the Prime Minister announced the tying of the Canadian dollar to the U.S. dollar at one-to-one—a *fait accompli* as the two currencies have hunted up and down, never more than 1% apart, for the past several months.

The timing of the announcement gave the world a weekend in which to think things over, the purpose being presumably to reduce oscillations. The New York Stock Market responded with an upward surge. The Dow-Jones Industrials closed at

"Mr. Chairman, are these unofficial figures I have in front of me—that each of you has in front of you—correct? Or have my informants been leading me down the garden path? The figures on the use of hard drugs, for example?"

"Madam President, I don't know quite how to answer that."

"You don't, eh? You're Chairman of the Joint Chiefs and for four years before that chief of staff of your service. If these figures are not right, how far are they off and which way?"

"Ma'am, that is a question that should be put to each of the Services, not to me."

"So? General, you are relieved of active duty. A request for retirement will be acted on favorably, later today. You are excused. General Smith, take the chair."

The President waited until the door closed behind the ex-Chairman. Then she said soberly, "Gentlemen, it gives me no pleasure to put an end to the career of a man with a long and brilliant record. But I cannot keep in a top spot in my official family a military officer who can't or won't answer questions that, in my opinion, must be answered if I am to carry out my duties as Commander in Chief. If he had answered, 'I don't know now but I'll start digging at once and won't stop until'—but he said nothing of the sort. I gave him two chances; he brushed me off." She sighed. "I suppose he dislikes taking orders from one with no military experience; I do not assume that my sex and skin color had anything to do with it. General Smith, you are in the chair by default; I can't ask you about the other Services. How about your own? Hard drugs."

"I suspect that this figure is conservative, Ma'am. I've been trying to get hard data on hard drugs since I was appointed to this job a year ago. In most cases we need evidence from medical officers to make it stick . . . and all our doctors are overworked; we don't have nearly enough of them. Worse yet, some of the doctors are pushers themselves; two were caught."

"What happened to them? Making little ones out of big ones?"

"No, Ma'am. Discharged. In civilian practice, I suppose."

"For God's sake, *why*? Has the Army forgotten how to hold a court martial? Two drug pushers, simply sent home and still licensed to practice medicine—and to prescribe drugs. General, I'm shocked."

"Ma'am, may I say something in my own defense? Then you can have my request for retirement, if you wish it."

"Please. Go ahead."

"These cases occurred before I became Chief of Staff. At the time these two were caught, I was Superintendent of the War College; drugs are not a problem there. When last I had troop duty, I *did* have a policy of treating use of hard drugs as a criminal offense, as permitted and required by regulations. But the very most I ever managed was to get some sent to the V.A. for hospital cure and rehabilitation. Under the present rules, if a man has a good lawyer—and they do, usually—he can get away from courts martial and appeal to a civilian judge. That usually ends it."

"Madam President, may I add something?"

"Certainly, Admiral."

"Have you heard of the mutiny in the *Somers* about a century and a half back?"

"I— Yes, I think I have! A novel. *Voyage to the—Voyage to the First of December*. Right?"

"There was a novel some years back; I think that was the book's title. I haven't read it. Then you are aware that it was a tragic scandal, with mutineers hanged at the yardarms. What I wanted to say was this: I think the figures on drugs in the Navy are about right—lower than in the Army, of course; the circumstances are different. But what is killing the Navy—aside from a shortage of career officer material—is that both mutiny and sabotage are out of hand . . . because offenses that used to rate hanging from the yardarm are now treated as 'Boys will be boys.' A great deal of it does derive from a change in the legal structure, as the General said. I would rather have five ships properly maintained, properly manned, shipshape and Bristol style, than ten ships undermanned and shot through with men who should never have been accepted in the first place. A stupid and sullen seaman is worse than no one at all."

The President said, "Judges, chapter seven."

The Admiral looked puzzled. The Marine Commandant suddenly said, "Gideon's Band!"

"Exactly. I suspect that we have been trying to meet

quotas—numbers of men—rather than placing quality first. I'm sure it's not as simple as that, but that does seem to be part of it. General, does the Air Force have any different slant on this?"

"No, Ma'am, I think the Navy and the Corps both speak for me. And the Army . . . although Smitty's problems are different from ours. Our worst problem is hanging on to trained men . . . because what we teach them, flying and electronics especially, are very salable on the outside. I want to add something, though. Marijuana is not on the list of drugs. It may very well be true that grass is no worse than liquor. But neither one mixes with driving a flying machine. Or anything in an airplane. But grass is harder to cope with. A stash is easier to hide than a bottle, and it is harder to tell when a man is stoned than when he is drunk. And much harder to prove. I welcome suggestions."

"I think we all do. Although I think we've pinpointed one essential. Quality before quantity. Gentlemen, we'll let this marinate about ten days while all of us try to spot all of the basic things that are wrong . . . then meet again and exchange ideas. In writing. Call the shots as you see them, don't be afraid of hurting feelings, pay no attention to sacred cows. Admiral, you found things wrong with the military legal system; please analyse the matter, with specific recommendations. If you truly feel that we need to go back to keelhauling and hanging at the yardarm, say so."

"I do not, Ma'am. But I do think the present rules are more suited to a Scout camp than to a fighting force. Punishment should be swift and certain; mutineers should not be coddled. We need a new code."

"Work on it. I assume that you have legal aides. Mr. Secretary of Defense, I have not intended to monopolize the floor. Before we adjourn, I want you to give us your opinions on problems of discipline. I would like to hear comment on those figures I supplied, all categories. But you aren't limited to that. Feel free to bring

up anything. I think that discipline in the Armed Forces is as serious a problem as I face . . . and the most difficult."

"Discipline is not one of the duties of the Secretary of Defense."

"So? What are your duties?"

"To manage my department. Discipline belongs to these gentlemen. Not to me. And certainly not to *you*. You are way out of line."

"You forgot something, sir. The President is in the direct line of command, at the top, and cannot avoid responsibility for any aspect of her command. The Secretary of Defense is *not* in the line of command; he is an executive secretary for the President. However, since you see your job as merely managerial, and not concerned with morale and discipline, I won't press you about it. I have your signed resignation in my desk, inherited from my predecessor. I'm accepting it. At once."

The ex-Secretary leaned back and laughed. "How just like a woman! Ruffle her feathers and she flies off the handle. But it's okay, Shortie; I didn't intend to stay this long. After the Chief died I was ready to quit. But Charlie asked me to stick around a little longer, keep an eye on you. I know what you did to him the day of the tragedy, standing in his way when he was entitled to the job. You never were anything but an election poster. Didn't anybody ever tell you that?"

"You may leave now. You're excused."

"Oh, I'm leaving; I've got a press conference in ten minutes. Just one thing: You said Joe probably disliked taking orders from you because you've had no military experience. Nonsense. Any top brass expects to take orders from a civilian. But no real man will take orders from a nigger, much less a nigger wench."

The Marine was out of his chair so fast that it overturned, snatched the ex-Secretary out of his chair and got a hammerlock on him—but beat the others to it only by being closest.

"Down on your knees and apologize, you jerk! That's the *President of the United States* you're talking to!" The Marine General's deep South accent, ordinarily carefully corrected, came out in full force, thick as gumbo.

"Make him take his hands off me!"

"Keep him secure, General. And thank you, sir. But don't rough him up more than necessary. Admiral, if you will be so kind as to check, I think you will find two Marines and two Secret Service men just outside that door. Please ask one of them to telephone for two White House Police. I want this person removed from the building and not allowed back in. Nor back into the Pentagon, ever. Most especially not into his former office."

"A pleasure, Ma'am!"

"Thank you, sir. I hope to see you all here at the same time a week from Thursday. General Smith, I ask you to remain chairman pro tem, in addition to your regular duties. Adjourn when it suits you. I'm withdrawing now; I want to lie down. I find that I am a bit shaky. . . ."

CND 406CRH

CHEYENNE—LEGISLATURE BOTH HOUSES PASSED OVERWHELMINGLY FIRST AND SECOND READING EMERGENCY MEASURE RESTORING PAUPERS OATH FOR RECIPIENTS OF ANY PUBLIC ASSISTANCE OF ANY SORT REPEAT ANY SORT IN RESPONSE TO GOVERNOR'S IMPASSIONED CLAIM THAT THERE WOULD BE NO MONEY FOR THE BLIND AND THE TOTALLY HELPLESS UNLESS STATE RETURNED TO NINETEENTH CENTURY TEST OF ELIGIBILITY MORE MORE

CND409CRH

CHEYENNE—AMERICAN CIVIL LIBERTIES UNION WILL FILE CLASS ACTION IN FEDERAL COURT TO STOP RESTORATION OF PAUPERS OATH AS PREREQUISITE FOR PUBLIC ASSISTANCE.

"Come in, Senator! Thank you for doing me this favor!"

"Madam President, it would be a pleasure to call on you at any time even if you were not President. Perhaps more."

"Uncle Sam, I don't know what that means but I like it. Now to work! Would it suit you to work for me?"

"You know it would, my dear—but I have a constituency."

"I don't mean resign and take a job here. But can't you pair votes, or something? I need a lot of help from you right now and more later."

"Anything the President wants, the President gets. Yes, I can always arrange a pair . . . even when I'm only nominally out of the District." He looked down at her. "Trouble?"

"Work I don't know how to handle. I've got to appoint twenty-three judges and I can't put it off much longer. And I don't know how to tell a knucklehead from an Oliver Wendell Holmes. See that tall stack? And that one? Those are the written opinions—or other legal writings if they are not already judges—from the candidates for judgeships. No names on them, and other identifications blacked out. Just identification numbers. I thought I could read this mess and tell which ones had their heads screwed on tight. I can't. I don't understand legalese, I'm not a lawyer."

"I'm not a lawyer either, bright eyes."

"No, but you're the world's leading semanticist. I figured that, if you couldn't understand something, then it was really nonsense."

"It's a good approach. If a person of normal intelligence, and a reasonably full education, cannot understand a piece of prose, then it *is* gibberish. But you shouldn't be doing it; you have a country to worry about. I don't have time, either, but I'll take time; my staff are quite competent to wipe the noses and hold the hands of my constituents for a while. I'll arrange it."

"Then you'll do it! Uncle Sam, you're a dear!"

"But I want a bribe."

"You do? I thought *I* was supposed to be offered bribes, not have to pay them."

"I'm eccentric. I take bribes only from pretty little girls I've known a long time."

"You're eccentric, all right. What is that thing you wear on your head? A cow pat?"

"My dear, you're colorblind. Madam President, I have a proposed amendment to the Constitution I want you to sponsor . . . and by great good luck I just happen to have a copy of it on me."

"I'll bet you sleep with a copy of it on you. No, just put it on the desk. Now tell me what it is supposed to accomplish."

"It permits a citizen to challenge the Constitutionality of any law or regulation, Federal or any lesser authority, on the grounds that it is ambivalent, equivocal, or cannot be understood by a person of average intelligence. Paragraph two defines 'average intelligence.' Paragraph three defines and limits the tests that may be used to test the challenged law. The fourth paragraph excludes law students, law school graduates, lawyers, judges, and uncertified j.p.'s from being test subjects. I call it 'the Semantic Amendment.'"

"No, you don't; you call it 'the Plain English Amendment.' Show biz, Uncle Sam. Senator, under this amendment could a person challenge the income tax law on the grounds that he has to hire an expert to make out his form 1040?"

"He certainly could. And he would win, too, as no three I.R.S men can get the same answers out of identical data if the picture is at all complex."

"Hmm— What if he's bright enough but can't read?"

"Paragraph three."

"How about the Federal Budget? It isn't law in the usual meaning but Congress votes on it and it has the force of law, where it applies."

"First paragraph. It quacks like a duck, waddles like a duck—it's a duck."

"I'll try to study this before I fall asleep tonight. Senator, this one we're going to put over!"

"Don't be too certain, Madam President. Lawyers are going to hate this . . . and the Congress and all the state legislatures have a majority of lawyers."

"And every one of them not anxious to lose his job. That's their weakness . . . because it's awfully easy to work up hate against lawyers. Senator, this bill will be introduced by lawyers. Both Houses. Both parties. Not by you, you're not a lawyer. Uncle Sam, I'm an amateur president but I'm a pro in show biz. It'll play in Paducah."

The two Presidents were seated alone at the front of the crowded grandstand. Two kilometers in front of them a spaceship, small compared with the Shuttle assemblage, but close to the size of the Shuttle alone, stood upright in the bright Mexican mountain sunshine. A voice from everywhere was counting: "—sixty-one seconds one minute . . . fifty-nine . . . fifty-eight—"

She said, "How are you coming with Spanglish, Señor el Presidente?"

He shrugged and smiled, "As before, Doña la Presidenta. I know it is simple; I hear your people and ours talking in it . . . and I understand them. But I don't have time to study. When I leave office—" He spread his hands.

"I know. Perhaps two years from now—I can't believe I've been in office only six years. It feels like sixty."

"You've accomplished sixty years of statecraft; the whole world is awestruck."

"—forty-one . . . forty . . . thirty-nine—"

"There never was anything really seriously wrong with my country, Mr. President. We made some silly mistakes, then compounded them by being stubborn. The Fence, for example. What's the point in a Fence that doesn't work? So I had it torn down."

"Madam, your most creative act of statesmanship! Without that act of faith, you and I could never have put over our Treaty of Mutual Assistance. And the dozen major advances we have started under it. This. You and I would not be sitting here."

"Yes. No more wetbacks and *this*. Mr. President, I *still* don't understand how a beam of light can put a spaceship into orbit."

"Neither do I, Madam President, neither do I. But I believe your engineers."

"So do I but it frightens me."

"—fifteen . . . The Binational Solar Power Zone is now on standby power . . . nine . . . eight—"

"*Oh!* Will you hold my hand? *Please!*"

"—four! . . . three! . . . two! . . . one! . . . *LIGHT!*"

A single inhalation by thousands, then came the everywhere voice in soft, reverent tones: "Look at that bastard go!"



"—direct from O'Neill Village, Ell-Five. It's a beautiful day here, it's *always* a beautiful day here. But today is our happiest fiesta ever; little Ariel Henson Jones, first baby born in space, is one year old today. All four of her grandparents are here, her father's parents having traveled all the way from Over-the-Rainbow, Ell-Four, via Luna City Complex, just to be here on this great day. Don't repeat this but a little bird, a parrot, told me that one of Ariel's grandmothers is pregnant again. I won't say which one but it's *personal* good news for *all* of us here in the sky because, if true and I can assure you it is, it is one more and very important datum in the rapidly growing list to show that youthfulness in all ways is markedly extended simply by living in free-fall. Correction: the mild acceleration we experience at the skin of our Village . . . but which we can leave behind completely at any time for free-fall sports at the axis.

"And *you* can enjoy them, too. This newscast comes to you sponsored by O'Neill Village Chamber of Commerce. Visitors welcome. You haven't *lived* until you ride the Light Beam, the cheapest way to travel per thousand kilometers ever invented by a factor of at least one hundred . . . and not uncomfortable even the first few seconds since the installation of the new total-support hydraulic couches. Also you haven't lived until you've seen our free-fall ballet! You think Las Vegas has shows? Wait till you see a Coriolis torch dance. Or what free-fall does for a hundred-centimeter bust. Oh, boy! Or if you like to gamble we'll take your money with brand-new games as happily as Monte Carlo or Atlantic City. See your travel agent for a variety of package vacations.

"Or more than a vacation. Buying a share in the Village is cheaper than buying a house in most cities down heavyside. But if you are young and healthy and possess certain needed skills your migration into the sky can be subsidized. Phone the placement office here for details, same rates as from San Francisco to New York. Wups! Almost forgot to tell you: knowledge of industrial Spanglish required, plus some Brownie points for any other language you know. . . ."



It *could* be that way, over the Rainbow. As Madam President said, there never has been anything incurably wrong with our country and our world—just a horrid accumulation of silly mistakes that could be corrected with horse sense and the will to do it.

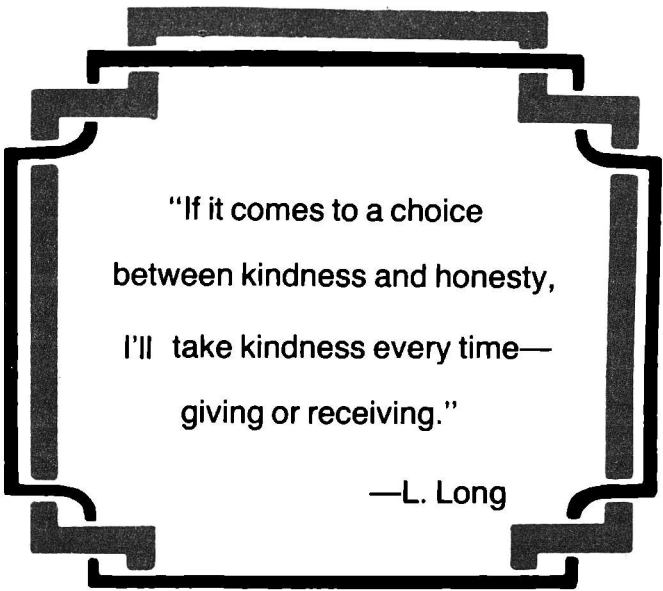
We have a lot of healthy, intelligent people with a wide spread of useful skills, trades, and professions. We have a wonderful big country not yet too crowded and still wealthy in real wealth—oh, bankrupt on paper but that can always be corrected with real wealth, will, and work. Actually it's easier to be happy and get rich than it is to go down the chute. This country has

so much going for it that it takes a lot of work combined with wrong-headed stubbornness to ruin this country. It's not easy.

☆ ☆ ☆

In the meantime don't go away. There are still a lot of sacred cows I haven't kicked but plan to . . . someday. So, unless I'm hit by a taxicab while swiveling on my cane to ogle pretty girls, I'll be back.

The End.



"If it comes to a choice
between kindness and honesty,
I'll take kindness every time—
giving or receiving."

—L. Long



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