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SCIENCE FICTION analog SCIENCE FACT

JULY 1973 60c 30p
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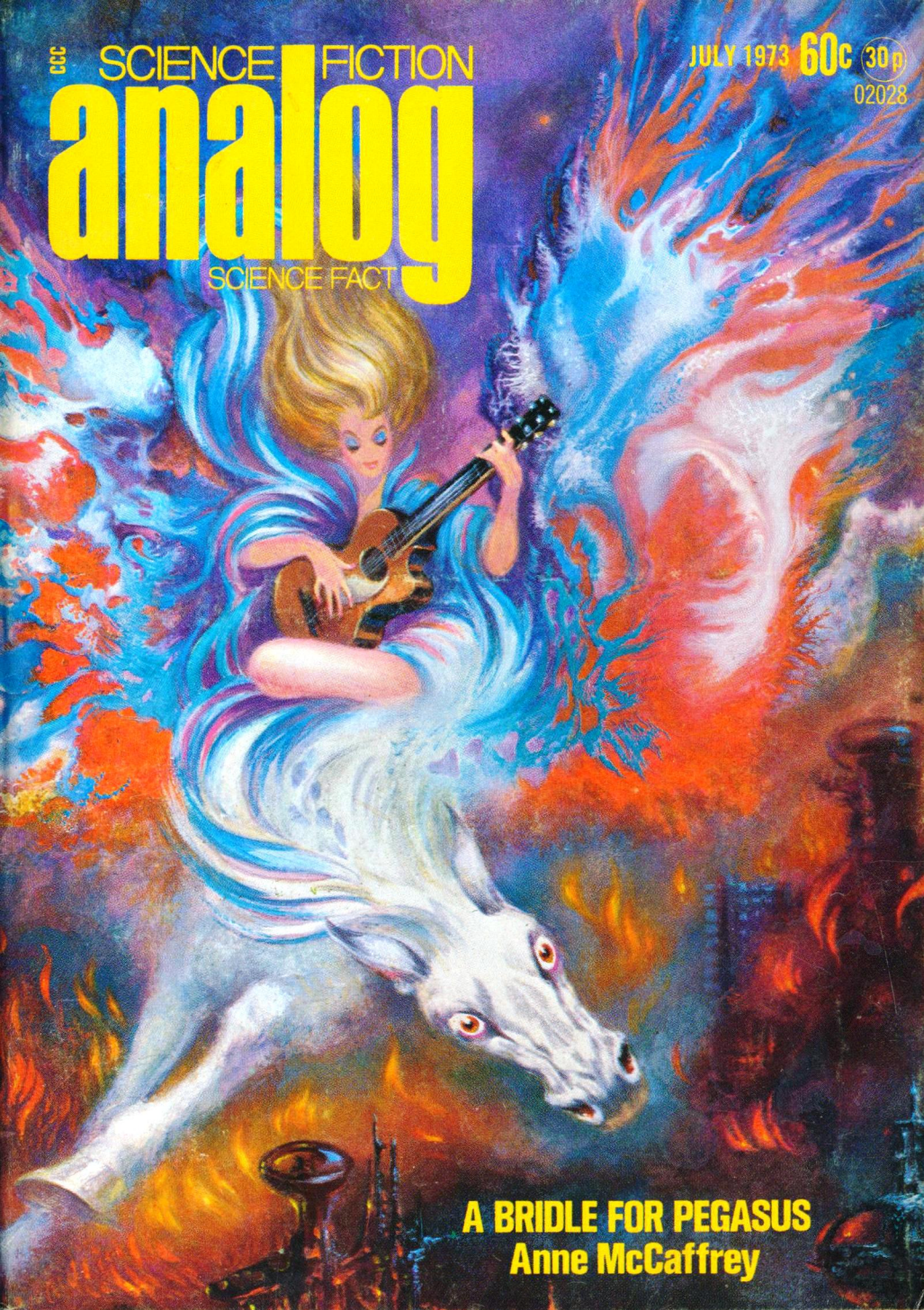

A BRIDLE FOR PEGASUS
Anne McCaffrey

I.O.U.

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Because some of us can still remember what it was like when we were in your boots.

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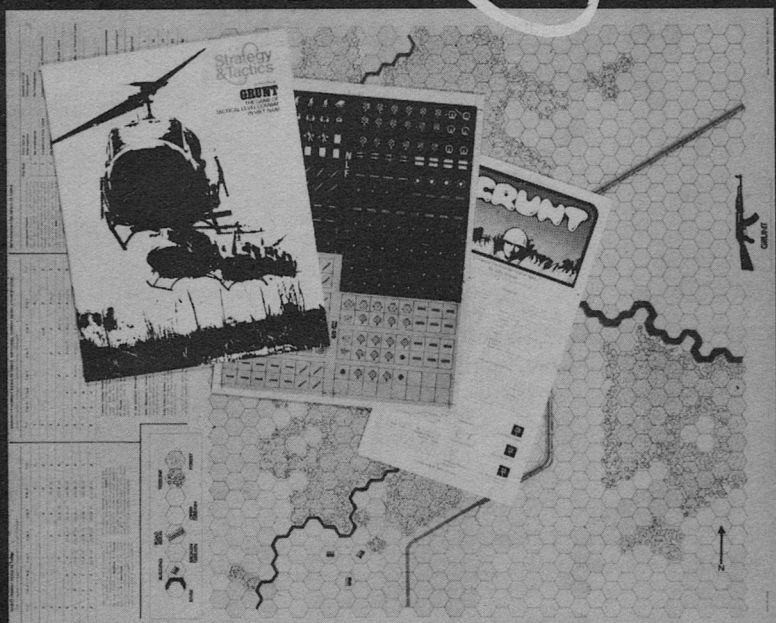
So we'll give all we can. Because we know the USO's work isn't done as long as there's one serviceman away from home. **Put yourself in his boots.**

USO

Strategy & Tactics



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Next Issue On Sale July 10, 1973
$6.00 per year in the U.S.A.
60 cents per copy
Cover by Kelly Freas

Vol. XCI, No. 5 / JULY 1973

NOVELETTES

SHORT STORIES

SCIENCE FACT

READER'S DEPARTMENTS

Editorial and Advertising offices: 420 Lexington Avenue, New York, N. Y. 10017
Subscriptions: Analog Science Fiction/Science Fact, Box 5205, Boulder Colorado 80302

EDITORIAL

THE R&D BUDGET

There's an old Italian story about a peasant farmer who decided one day that his mule ate too much hay.

A thrifty man, he cut the mule's ration in half. For a solid week the mule worked just as it had before the cut in its food. The peasant, seeing this, again halved the mule's ration of hay. The mule still worked as hard as ever. Delighted with his economy drive, the farmer stopped feeding the mule altogether. For days on end the mule worked fine. Then one morning it keeled over and died.

The peasant was furious, and started kicking the mule's emaciated corpse. "Ungrateful beast!" he screamed. "Here I teach you how to work without eating, and you go and die on me!"

Somehow, the President's fiscal year 1974 budget for research and development brings that story to mind.

You don't have to take too many taxis that are driven by Ph.D. physicists to realize that the research and development industry is starving to death in the United States. Many people had thought that with the Vietnam fighting wound down, the Nixon Administration would begin to make good on its promises to devote more of the nation's brains and budget to solving domestic problems in transportation, economic growth, city development, education, pollution control, law enforcement, et cetera.

If that is the White House's intention, the fiscal 1974 budget puts an impenetrable disguise over it.

Here is a quick rundown of the budget obligations—the amount of money asked for in the budget—for R&D over the fiscal years 1972, 1973, and 1974. The dollar figures are in millions.

Department	1972	1973	1974
Department of Defense	$8,294	$8,338	$8,808
Nat'l Aeronautics & Space Administration	3,183	3,383	2,995
Health, Education & Welfare	1,763	1,832	1,969
Atomic Energy Commission	1,298	1,359	1,411
National Science Foundation	456	461	516
Department of Transportation	351	367	425
Department of Agriculture	353	378	351
Department of the Interior	220	259	262
Department of Commerce	184	214	211
Environmental Protection Agency	122	177	138
Veterans Administration	71	76	78
Housing & Urban Development	47	43	71
Department of Justice	24	39	54
All Other	134	184	141
Total R&D Obligations	$16,500	$17,110	$17,430

While most of the agencies and departments received modest "cost of living" increases, it is significant that the NASA budget went down. So did the budget for the Environmental Protection Agency, the people who are supposed to be policing all those shiny new pollution control laws that the Congress has passed over recent years.

The White House has made much of its "game plan" to devote more of the nation's energies to solving nonmilitary problems. Yet the Department of Defense's R&D budget is still almost half of the total R&D request. DOD and AEC combined get more money than *all* the rest of the R&D budget.

It's especially interesting to realize that the Department of Commerce budget includes the requirements of NOAA—the National Oceanic and Atmospheric Administration—the people who are supposed to be handling almost all of our research programs dealing with environmental problems, from the National Weather Service to the oceanographic vessels that are investigating the secrets of the sea. Commerce's budget is down, and most of NOAA's programs are being drastically cut back.

The Department of the Interior is responsible for a number of programs aimed at solving the energy crisis. Most of the research on new methods of producing electrical power—outside of nuclear sources—

reside in the Interior Department's agencies, such as the Office of Coal Research. If we are ever to find viable alternatives to nuclear power, such as magnetohydrodynamics, superconducting generators and transmission lines, coal gassification (to name three), they will come from the Interior Department. But not this year.

In the Atomic Energy Commission itself, only $250 million of its $1.411-billion budget will be devoted to nonmilitary research. In addition, $323 million is earmarked for development of the fast breeder reactor (not research), while only $88 million will be devoted to thermonuclear fusion research.

The National Institutes of Health (part of HEW), where much of the nation's medical research is sponsored, suffers a $250-million cutback in the new budget. While programs for ending cancer and heart disease are fanfared by the press corps, most medical research efforts are being bled to death.

Then there's the matter of the President's decisions to "impound" funds already appropriated by the Congress. For example, last year the President directed the Office of Management and Budget to withhold $62.4 million from the operating funds of the National Science Foundation. This money has been added to the NSF's budget for fiscal 1974, which makes it look as if the NSF is $62.4 million richer than it really is.

This "impounding" tactic really means that the President can ignore the desires of Congress—our representatives—and withhold voted funds from any agency. Then by "restoring" the funds he can juggle the budget to his public-relations advantage. If you were a researcher whose grant was killed by last year's "impoundment," it won't bring you much joy to find that the funds are restored this year. Chances are you're now in another line of work. Or unemployed. Researchers—like most people—get cranky when they're asked to stop eating for a few months.

And "impounding" six billion dollars appropriated for water treatment facilities is a peculiar way to fight pollution.

Nor is the budget the only sign of the Nixon Administration's disenchantment with science and technology.

The Office of Science and Technology, which was established by President Eisenhower in the furor immediately following the first Sputnik in 1957, has been abolished. The President's Science Adviser, who headed OST, is likewise eliminated. This means that there is no scientific adviser on the White House staff. Which isn't much of a change, actually, over recent practice: the last Science Adviser, Edward David, hadn't been able to see his boss for many months before he resigned.

Science advice will now come

from the head of the National Science Foundation. This is sort of like abolishing the Joint Chiefs of Staff and closing up the Pentagon, and expecting to get just as good a job of military planning and advice from the commanding officer of the Marine Corps. It *might* work; but it probably won't.

One of the vast contradictions of the Administration's public image is that it praises science and exhorts the nation to seek ways of utilizing our scientific know-how, yet at the same time it slashes science funding and pushes scientific advice out the White House window. An upper-floor window, at that.

Tossing around figures of millions and billions of dollars hardly sounds as if science is being starved to death in this nation. Yet the brutal fact is that starvation is here for American science. Scientific research and technological development are multi-billion-dollar industries. No one expects the automobile industry to produce a profit by cutting its income. No one expects any business to flourish by cutting its basic source of revenue.

If we are to utilize our tremendous scientific and technological capabilities to solve the problems this nation faces, then we must be ready and able to pay the bills.

A case in point. Early in 1972, great fanfares were produced by the White House public relations people about a forthcoming program for New Technology Opportunities. William M. Magruder, who headed the Government's ill-fated SST effort, was personally picked by the President to head the NTO program.

In effect, the goal of the program was to pick out areas where America's science and technology could be applied in new ways to solve pressing national problems, such as the energy crisis, transportation, et cetera.

Magruder apparently did a creditable job, and recommended to the President a strong program that attacked the main problems we face. But it cost more than a billion dollars. *Sic transit* NTO.

The New Technology Opportunities program that eventually emerged from the White House was funded at $358 million, mostly drawn from existing budgets of the various agencies involved. Instead of a major new effort to harness our scientific and engineering talents, the program was a grab-bag of existing programs dusted off lightly and dressed in new—although threadbare—clothes. The only real new efforts to come out of NTO so far have been comparatively minor studies sponsored by the National Science Foundation and the National Bureau of Standards. The subject of these studies is—how to use our science and technology capabilities to solve pressing national problems. Which was Magruder's job, in the first place!

In other words, when you don't want to face up to doing the job, hire a committee to study it. Hopefully, the problem will go away.

The problems won't go away. They're merely going to get worse.

What are some of the vital problems that increased R&D effort can help to solve? Here are a few:

Economic competition with other nations. We now import more goods than we export. Our balance of payments deficits continue to drain gold from this nation. Many industries—from automobiles to shoes—are feeling the hot breath of foreign competitors on their necks.

One of our principal foreign competitors is Japan. The Japanese have shown great diligence and ingenuity in moving scientific ideas out of the research laboratory and into commercially-profitable products. But they do comparatively little research on their own. They get most of their research ideas, they freely admit, from work done in the U.S.! Some government officials have hinted that we should stop making our research results available to foreign readers; this would mean, in essence, classifying almost all the research done in this nation. The result would be a crippling blow to American research: freedom of information is vital to good science.

Why not reverse the coin and ask ourselves why our industries

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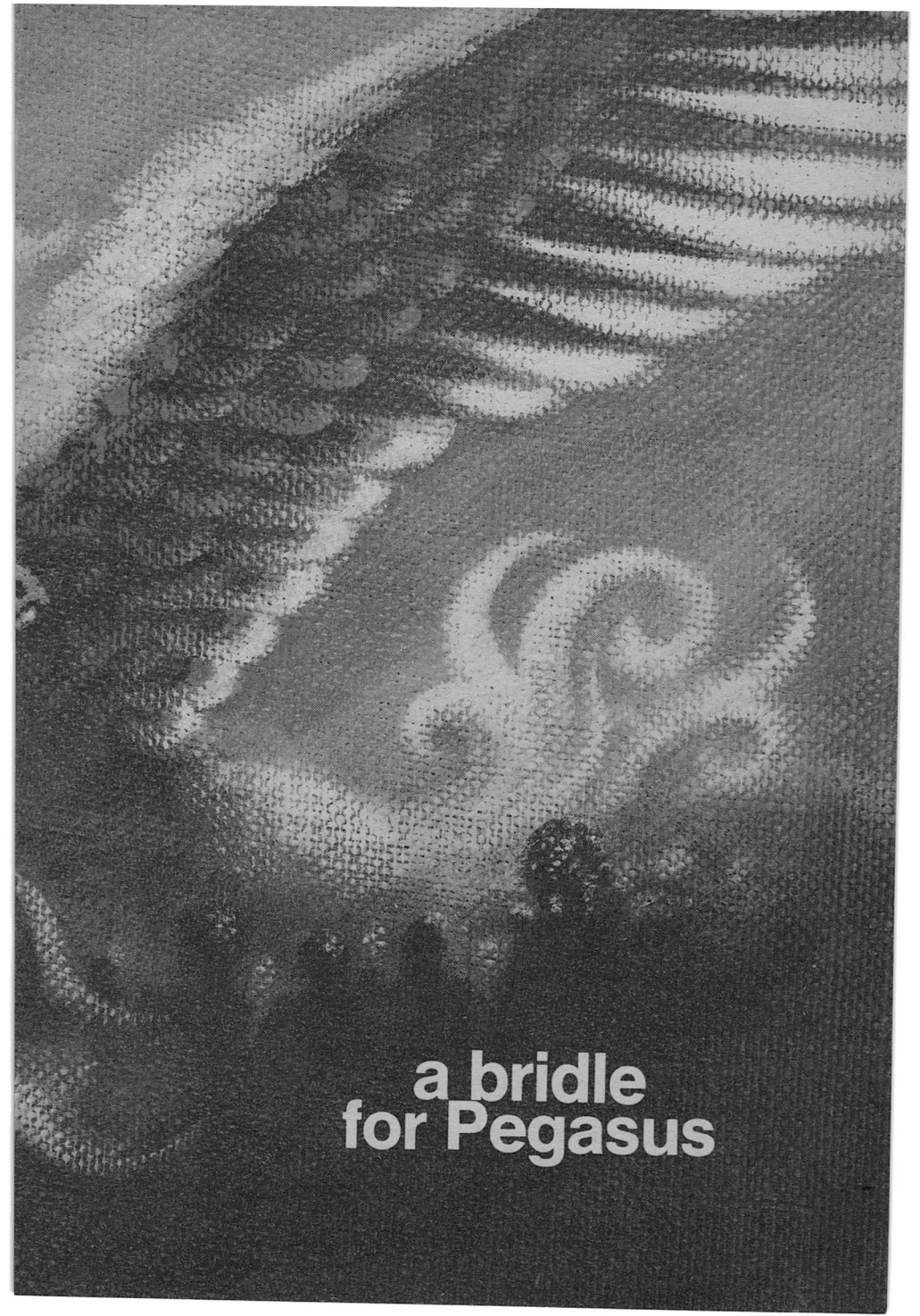
KELLY FREAS


a bridle
for Pegasus

Pitchblende doesn't power nuclear reactors, and crude oil doesn't drive automobiles. Psi Talent is extremely valuable—but only when it's refined.

ANNE McCAFFREY

When Daffyd op Owen, Director of the Eastern American Parapsychological Center, reached his office, there was a message on his desk to call Sally Iselin as soon as he had a moment. To a semantically-sensitive personality, the phrasing was provocative. Added to that the fact that Sally Iselin was in charge of recruit-testing . . . Daffyd punched her call numbers as soon as he read the note, disregarding other red- and white-flagged tapes and messages. If only one psi-latent was uncovered in a month of public information broadcasts, the program would be worth its cost.

"Daffyd here, Sally. You rang me?"

"Oh, Daffyd!" She sounded surprised and a tinge embarrassed. "I'm not really certain if I should bother you . . ."

"My great grandmother used to say, 'If it's doubtful, it's dirty.'"

"I'm not talking about a shirt, Daffyd." Sally's usual levity was missing. "I'm talking about people."

"Which people?" It was like pulling screws from wood: intriguingly un-Sallyish.

"Well, Daffyd, I'd hate to prejudice you. But . . . well, will you take me out tonight? There's a place I want you to feel. I *can't* figure out what it is myself and I know something happened."

"Curiouser and curiouser. You've hooked me . . ."

"Oh, damn. I don't want to *hook* you. I've gone and done what I shouldn't oughta."

Daffyd laughed. "Sally, all you've done is arouse my very considerable, insatiable curiosity."

"All right, elephant's child. Pick me up at nine; you'll need the copter and *money.*" Her voice darkened with baleful implications of wild spending and debauchery, but there was a rippling undercurrent of laughter which told Daffyd that Sally was herself again.

"With as many bundles as Lester

will allow me. At nine, then!"

He depressed the comset button just as the door opened to admit Lester Welch, the Center's business manager and one of its few non-Talented personnel. At one time, Lester was the electronics chief for the Center.

"What's on Iselin's alleged mind?"

"I can't 'path over a phone," Daffyd replied, deliberately misinterpreting Lester.

The man swore and glared sourly at his boss. "All right, so you won't talk either. Maybe I've no Talent but I don't need it to know something's got Sally excited. She's so careful to sound calm."

Daffyd shrugged his shoulders and reached for the in-tapes. "Soon as I know, you will. Anything else bothering you this fine morning? And Sally says I need bundles tonight."

Lester eyed him in surprise for a moment and then snorted. He pointed to the finance-coded blue tape among the urgent flags Daffyd was fingering.

"Some local yokel from East Waterless Ford upstate wants to tax the Center's residential accommodations, same as any other apartment block. Claims the revenue on such 'high-income residents' would reduce the state's deficit by nine percent."

Daffyd whistled appreciatively. "He's probably right but for the fact that this is a registered restricted commune and those high-income residents turn every credit of their salaries over to you," Daffyd gestured extravagantly, "for the Center."

"Listen, Dave, he's building a pretty good case," Welch growled.

Op Owen sighed. There was always something or someone or some committee picking away at the Center, trying to disrupt, destroy or discredit it despite all the careful publicity to show average Joe Citizen how much he personally gained from the existence of the Center and its Talented residents.

"They did the same thing in New Jersey, you know, when the Princeton University Complex put up those academician villages to counteract the high price of real estate and taxes," Lester reminded him sourly.

"I'll listen, I'll listen. Now, go away, Les." Daffyd inserted Welch's tape in the console.

Lester growled something under his breath as he left. And Daffyd op Owen listened. He didn't like what he heard, but the state senator had certainly done some of his homework. Revenues from the Center's residential buildings would indeed be a tidy pile in the state's chronically anemic treasury. Only the Center was in Jerhattan proper by a mile and a half, and therefore its revenues were the city's, if anyone's.

"Get me Julian Pennstrak,

please," Daffyd asked his secretary.

The city manager might be of some assistance here. Certainly he'd be interested in what this upstate character, Aaron Greenfield, was proposing. If Julian didn't already know. Not much slipped past the affable Pennstrak's eagle eye.

Pennstrak wasn't available but his secretary tactfully put Daffyd through to Pat Tawfik, Pennstrak's speech writer who was, in actual fact, his Talent guard.

"Yes, Dave, Julian's been keeping an eye on Greenfield's proposal," Pat told him. "In fact, Julian had him in here for a long cozy chat when we first got wind of the scheme. Greenfield's like Zeusman: suspicious and scared of us supermen."

"Julian told him that the residential buildings are communal . . . ?"

"Yes, and Julian showed him the figures Lester Welch files every year, plus the auditors' reports. Cut no ice! In fact, if anything," and Pat grimaced, "it only confirmed Greenfield's notion that the Center is a rich source of additional income."

"The Center is also in Jerhattan proper."

"Julian made that point but Greenfield's one of those allocation goons: all for one and one for all . . . all monies being in one kitty—his. He's the state budget chairman, you see."

Daffyd nodded.

"I didn't want to worry you unnecessarily, Daffyd," Pat went on apologetically.

Daffyd suppressed a tart rejoinder and sighed instead.

"Pat, it's easier to pull a weed if it's small."

"A weed? That's a good one. Greenfield's a weed all right." Pat sounded unusually acerbic. "I'll tell Julian you called and that you're worried."

"No. I'm not worried, Pat. Not yet."

"I would be if I were you," she said, all gloom.

"Is there a pre-cog?"

"No specific ones. But frankly, Dave, I'm far more worried about the city's climate than anything old Aaron Leftfield perpetrates. And so is Julian. He's street-walking today." She gave a reassuring wave of her hand. "Oh, I sent one of the LEO sensitives with him. I can't move so fast these days." She glanced down at her gravid abdomen. "You've seen my report?"

"You sent one in?" Daffyd began riffling through the tapes.

"It should be on your desk. It'd better be on your desk."

Daffyd found the purple-backed city admin tape and waved it at her.

"It is. Lester Welch had first crack at me."

"And he didn't mention our tape?" She made an exasperated noise. "Look, Dave, listen to it now because, believe me, it's more im-

portant than Greenfield even if Lester doesn't think so."

"Is that a pre-cog, Pat?"

"You tell me it's my condition," she said, suddenly angry, "the way Julian does or a vitamin deficiency like my o.b. does and I'll resign." The anger as suddenly drained from her face. "God, don't I just wish I could!"

"Pat, d'you want a few weeks' relief?"

Daffyd op Owen caught the shifting emotions on her face: sullen resentment giving way to hope instantly replaced by resignation. "Don't, Dave. Having Talent is like riding a winged horse: you get a magnificent view but you can't always dismount when you want to. So don't tease me!"

"I wouldn't and you know it. I can send out a mayday . . ."

"And overwork some other poor Talent?" Pat's chin lifted. "I'll be all right, Dave. Honest! It's just that . . . well, hell, listen to the report. And remember, it's a pan-ethnic problem this year."

This year? Another loaded phrase. Daffyd op Owen inserted the city admin tape and his concern over the Greenfield proposal faded to insignificance as he recognized the more imminent danger of a disturbed city. He began to wonder who else had thought to save their dear director trouble by not reporting the grim facts he now heard. Because if the correlation staff had slipped up on reading pre-cogs, he'd downgrade the lot.

Brief, violent inter-ethnic quarrels over contract employment during the winter had been mediated but, within the city's ethnic sectors, the truce had been uneasy: each segment certain that another had received what plums existed. (Most of the spot employment during the winter had been make-work, paid for by funds pared from other pressing needs to give the proud their sop.) Most of the agitation could be traced to a young Pan-Slavic leader, Vsevolod Roznine. The report noted that Roznine was more feared than popular with his constituents and, although several attempts had been made to cool or placate the agitator, he had neatly avoided the traps. The report closed with the note that Roznine might have latent Talent. However, the only mental contact made had been so distasteful to the Talent that he had broken it off before he could implant any suggestion to go to the Center for testing.

"The man's public mind is a sewer," was the final comment.

Daffyd op Owen made a steeple of his fingers and, twirling his swivel chair, gazed out his window to the orderly grounds below. He felt unaccountably depressed yet he could be justifiably proud of what Talent in general and Eastern American Center in particular had been able to accomplish in the past decades. Op Owen could appreciate, and it was no pre-cog, how

much more had to be done on numerous levels: public, private, civic, clinical, military, spatial, and most important, inner. No matter what the dominant Talent—pre-cog, telepath, teleport, kinetic, empathic—the Talented were still very human people, above and beyond their special gifts which so often complicated adjustment therapy.

They had professional immunity at long last, for all registered Talents. Another giant step forward. They had had acceptance on a commercial level for many years where Talent could steadily show profit to management. Since the first body-Talents had been able to point out assassins in crowds (even before pre-cogs were accepted and acted on by key personnel), they'd been accepted by intelligent people. But the suspicious were the majority and they still had to be convinced that the Talented were not monsters, supermen, and dangerously different.

He'd ruminated on this problem many times and it wasn't solving the other pressing problems before him. A city torn by the very ethnic strife that had once been hailed as a bonding compromise to the late Twentieth Century's lack of basic life-style values: summer was a-coming and, despite advances in weather control, a hot, dry spell which could cut the power available for city air-conditioning would only produce riot-breeding conditions.

So far, no major pre-cogs of disasters had been recorded and for such a large unit as Jerhattan, a trouble pre-cog was statistically more probable than one dealing with a small number of people or a single citizen. Scant reassurance, however.

And thank God, Talent was panethnic, thought Daffyd. He didn't have to worry about that ugly head rising against the Center.

He did tape an all-Talent alert on the city's climate. The great minds would now have a single thought. Perhaps they'd also have an answer.

When he picked Sally Iselin up at nine at the clinic door, she gave him a quick appraising look. Then her anxious-puppy expression changed to a radiant smile.

"I knew it. I knew it." And she all but war-danced a circle as she inspected his costume.

"What?" he asked, turning to keep her face in view.

"You dressed just right. How'd you know? I'm sure I didn't clue you. Are you positive you're not a pre-cog, too, Daffyd?"

"I'd rather not be."

Her vivacity faded instantly. She put a hand out, aborting the sympathetic gesture before she actually made a contact. He touched her fingers lightly in reassurance.

"Not to worry. I just had a tedious day. Felt like wearing glad threads."

Sally's eyes crinkled and her mouth tilted up as she cocked her head to one side. "You are indeed joyous," she said saucily as her glance took in his royal-blue, black-trimmed coverall.

"Look who's talking," and Daffyd grinned down at Sally in lime green and black swing tunic with matching high boots. Sally's puppy charm was a tonic and he wondered, as he often did in her company, why he didn't make more opportunities to enjoy it.

As he put a helping hand under her elbow to assist her up to the passenger side of the two-spot copter, she gave him a startled sideways glance. He caught the echo of mental astonishment before she started to chatter about the day's hopeful applicants.

"They come, Daffyd, swearing oaths that they've had this or that perception. Dorotea doesn't tap a one. We go through the routine but even with maximum perceptol, they come over dead dumb and stone blind."

Sally was a compulsive talker but Daffyd became aware that her present garrulity was a shield. He wondered what Sally would need to obscure. Propriety prohibited his making a quick probe but undoubtedly there'd be clues later on. Sally was entirely too open to be devious for very long.

She directed him to Sector K, northwest of the Center, where the worn hills struggled up from old swamplands: not a salubrious area despite reclamation and renovation efforts. There were still ruins of early Twentieth Century factories and it was by one such structure, a sprawling half-glass and brick affair called "The Fact," that Sally directed him to land.

"The place seems popular enough," Daffyd said as he had to circle several times to find a site for the copter.

Sally winced, eyeing the ranks of city-crawlers and the presence of both private and public transport copters. "Doesn't take long, does it, for the masses to latch onto a new thrill!"

"Oh? This is new?" He'd caught the worried tone of her thoughts. "Crowd bad for the project?"

"I don't know." She was more than worried. "I just don't know. It's just that . . ." She broke off, firmly pressing her lips together.

They stood in a short queue for billets, paying a credit apiece to get in.

"Milking the golden cow," Sally said with uncharacteristic bitterness as they passed the billets in at massive sliding doors which separated the outer hall from the vast factory space beyond.

"Guarding it, too," Daffyd said, noting the strong-arm types in meshed duty-alls.

"That might make more sense than you'd guess," Sally said in a very dark voice. Her mind was practically shouting "trouble."

"Will we need assistance?" he asked her, estimating how many empathic Talents might be needed in order to control a crowd of this size.

Sally didn't answer. She was looking around the enormous open area which was filling rapidly. It didn't require Talent to appreciate the aura of excited anticipation that emanated from the audience. The hall was by no means full yet, half the tables were still empty, but most of the couches of the inner circles were occupied. Daffyd had never seen such an assortment of styles, ages and conditions of furnishings.

"They must have been scouring the sector," Sally said. Then she indicated a table on the outer rim: a table, Daffyd noticed, which was convenient to one of the luminescent exit doors.

They were barely seated, Daffyd on Queen Anne, Sally on Swedish tubular, before a waiter inquired their pleasure.

"What's available?" Sally asked, simulating bored indifference. Daffyd was surprised that she felt the need to dissemble.

"You name it," replied the concessionaire, impatient. His tables were filling up.

Sally "told" Daffyd that this, too, was an innovation.

"Try something simple, *schatzie,*" Daffyd said, managing the verbal slurs of their assumed roles. "The Medboard warned you and I'm not copting you to the drain-brain again this month."

Sally affected petulance, then with dutiful resignation, asked for a mild caffeine. Daffyd, in character, asked for an esoteric blend.

"Nor am I copting you!"

"Make it two milds and bring the pot."

As the conman left, Daffyd leaned toward Sally. "Is this area disaffected?"

She wrinkled her nose. "We get a lot of hopefuls from this sector."

Sound had come on, more frequency drone than actual note. The dim lights on the girders were beginning to fade completely, and ground spots came on, adding their eerie moitié to the ambience. Sally looked toward the half-circle of stage which had remained semi-lit. The aura of expectation, of voracious emotional appetite increased perceptibly. Sally shivered and folded her arms across her breast but Daffyd sensed that the created atmosphere irritated more than distressed her.

She shifted in her chair nervously when the waiter appeared with cups and the pot. He served them disdainfully—he didn't make as much commission from the milder brews—and hurried off, grimacing thanks for the carefully generous gratuity.

The auditorium was almost full now and the conversational murmur impinged on Daffyd's senses as the snarl of the unfed. Yes, the

climate of the city was very uncertain indeed. He could feel the tension building rapidly now, with so many feeding it. He noticed the muscle boys spreading through the tables and couches, and he worried harder. The psychology of a crowd was theoretically understood but there was always that gap between theory and reality—that dangerous gap which could be bridged by the most insignificant event—when crowd exploded into riot. Daffyd and Sally were far too familiar with the "tone" of riot to be very comfortable in a pregnant situation.

In fact, Daffyd was leaning across the table to warn Sally that they might have to leave when the lighting of the stage area altered and a girl stepped into the center. She wore a white caftan-type unadorned robe and carried an old-fashioned twelve-string guitar. It had no umbilical amplifier, which surprised Daffyd as much as the girl's regal poise and simple appearance.

A camouflaged hand deposited a three-legged stool and the girl took her place on it without a backward glance.

Daffyd frowned at the darkness above the stage, wondering where the sound amplification was hidden. She couldn't possibly hope to reach and hold this crowd without electronic boosting of some kind.

Then Daffyd saw the relieved and pleased smile on Sally's face.

The girl settled herself, tossed back her mane of tawny hair and, without taking any notice of the audience, began to play softly. There was no need for mechanical amplification of that delicate sound. For the first note fell into a voracious silence, the most effective conductor.

No—and Daffyd sat up straight—every nerve in his body aware of a subtle, incredible pulse that picked up the gentle melody and expanded it—telepathically!

And this, too, was what Sally had hoped he'd feel, what she'd brought him here to confirm. He saw the happy triumph in her eyes. The girl's voice, a warm lyric soprano, intensified the pulse, "sounded" off the echo as she fed the multitude with a tender ethnic admonition to love one another. And . . . everyone did.

Daffyd listened and "listened," stunned physically and emotionally by the unusual experience: unusual even for a man whose life had been dedicated to the concept of unusual mental powers. On an intellectual plane, he was incredulous. He couldn't deduce how she was effecting this total rapport, this augmented pulse. It was not mechanical, of that he was certain. Why this sensation of "echo"?

The girl would have to be a broadcasting empath: an intelligent empath, unlike poor Harold Orley who hadn't any intellect at all. This young woman was consciously choosing and directing the emotion

she broadcast . . . wait! That was it . . . she was consciously directing the emotions . . . at whom? Not the individual minds of the listeners: they were responding but they could not account for the "generation" of emotion that enveloped everyone. There had to be sensitive minds to generate emotion like that and these people were parapsychically dead. Yet she was manipulating them in some way, using some method that was non-electrical and non-sonic.

The girl continued with a more complicated tune from some early Nineteenth Century religious minority which had settled in the eastern United States. And the "message" of the song was a soothing statement of acceptance. She was deliberately taking the audience out of the technocratic trap, transferring them to less complex days, lulling them into a mood of even greater receptivity. Nor was Daffyd immune to the charged atmosphere . . . except for that part of his brain which could not perceive how she was effecting this deft, mass control.

The singer finished that song and plucked the strings idly, chording into a different key. The third song, while no more intense than the first two, was a rollicking happy ballad, a spirit-lifter, a work-doer.

She was preparing her audience, Daffyd realized, deftly and carefully. He began to relax, or rather, the intellect which had been alerted, responded to the beguiling charm of her performance.

Daffyd was suddenly frightened. A deep pang, covered in a flash, overladen with worry that was lyric-inspired. Only it wasn't. Sally had felt the pang, too, glancing nervously around her. The rest of the audience didn't seem to catch alarm: they were in the young singer's complete thrall, caught up in the illusion of unpressured times and ways.

The fear was the singer's and it was not part of her song, Daffyd concluded, because he could detect no other influence, no newcomer in the hall, no change of lighting or aura. Sally was concentrating on the girl, too.

Why would she be frightened? She had the audience in the palm of her hand. She could turn them in any direction she chose to: she could . . .

Her song ended and, in a fluid movement, she rose, propped her guitar against the stool and casually disappeared into the shadowy rear of the stage.

Sally turned anxious eyes to Daffyd, and they shared the same knowledge. *She's the one who's frightened. She's leaving.*

And that's the most dangerous thing she could do, Daffyd told Sally.

No one in the audience moved and Daffyd didn't care. The lighting altered subtly, brighter now, and people began to shake off the

deep entrancement, reaching for cigarettes or drinks, starting soft conversations.

"They don't know she's not coming back. When they do . . ."

Daffyd signaled to Sally. It was imperative they leave: they couldn't risk the psychic distortion of a riot and, once this crowd discovered that the singer wasn't returning, their contentment would turn to sour, savage resentment. Caution governed Daffyd. They couldn't just leave. But they had to, somehow . . .

He reached across the table casually and deftly tipped the caffeine pot over.

"Of all the stupid jerks," Sally cried irritably, getting to her feet and holding her flared skirt away from her.

Daffyd rose, too, with many apologies. They received mildly irritated glances from nearby couples whose pleasant mood was disrupted. As Daffyd and Sally moved toward the main door, Sally kept up a running diatribe as to her escort's awkwardnesses and failings. They reached the sliding doors. The aura generated by the singer was fainter in the lobby and the close knot of men by the box office window interrupted their discussion to stare suspiciously at Daffyd and Sally.

"I can't sit around in this damp dress," Sally said in a nasal whine. "It'll stain and you know it's only this week's issue."

"Hon-love, it'll dry in a few moments. It was only . . ."

"You would be clumsy and right now . . ."

"Let's just stand outside a bit. It's warmer. You'll dry off and we won't miss any of the singing."

"If you make me miss any of Amalda's songs, I'll never, never forgive you . . ."

With such drivel they got out the main entrance. But not before Daffyd experienced a wash of such frightful lewd thoughts that he hastily closed off all awareness.

"Sally, how many minorities did you notice represented there?"

"Too many, in view of your memorandum this morning. Daffyd, I'm scared. And it's not Amalda's fear this time!"

"I'm calling Frank Gillings."

Sally pulled away. "I'll find the girl. She's got to have some kind of protection . . ."

"Can you find her?"

"I'm not sure. But I've got to try. Once that crowd realizes she's left for good . . ."

Sally turned to the right, toward the rear of the factory, slipping past the little city-crawlers until she was out of Daffyd's sight. He made for his copter and opened the emergency channel to the Center.

Charlie Moorfield was on duty and he instantly patched Daffyd through to LEO—the office of Law Enforcement and Order—as he was rousing the Center's riot control people. If they could get enough

telepaths to the site in time, they might dampen the incipient riot before LEO needed to resort to the unpopular expedient of gas control.

"Tell Frank Gillings that Roznine is here, too," Daffyd told the officer on the line.

"Roznine? What'n hell would he be doing listening to a singer?" the man asked.

"If you'd heard the effect this singer has on people, you'd understand."

The officer swore, at a loss for other words. Daffyd wished that swearing were as therapeutic for him.

"Keep the band open for us, Charlie . . ."

"Dave, you can't stay there . . ." Charlie's voice reached Daffyd's ears even several yards from the copter. Daffyd wished he'd be quiet. He had to concentrate on "listening" for the girl. He could sense Sally's direction but he was used to Sally's mind; he could have "found" her at a far greater distance. But the singer was unknown: alarmingly unknown, Daffyd realized, because he ought to be able to find her. He'd been in her presence, in touch with her for over half an hour, long enough for him to identify most minds and contact them again within a mile radius. She couldn't have got very far away in such a short time.

The beat of heavy-duty copters was audible now, coming in without lights and sirens. Daffyd looked east, willing the Center's fast transports to get here before the riot control squads. It was generally impossible to get enough telepaths during the day to quell an imminent riot unless there'd been a precog of trouble. But, of an evening, there was the entire Center's telepathic population. Now, if . . .

He heard the beginning of a subdued murmur from the building. The customers were getting restless. He hoped they hadn't yet realized that the singer wasn't taking a short break.

Someone opened a section of the big main doors, stood framed in the rectangle of light for a moment, peering out. Daffyd identified the stocky figure as Roznine's. Suddenly the figure of the ethnic leader froze. He stepped out, into the night, head up. The man's curses floated toward Daffyd as he slammed back into the building. Daffyd hurried in search of Sally, wondering what Roznine would do now he knew a LEO squad was on the way. Only . . . and Daffyd faltered midstride, how *could* Roznine know, if he did, that the big copters were LEO. Cargo firms used the same type. Yet op Owen knew with unarguable certainty that Roznine had properly identified the aircraft.

Daffyd came around the corner of the old factory just as the personnel hatch in the huge rear door opened. He counted five of the muscle boys, each taking off in a

different direction. Then a sixth man whose harsh urgent voice ordered them to find those "effing copouts" or they'd be subsistence-livers for the rest of their breathing days.

Copouts. Plural, thought Daffyd. Who besides Amalda? No time now for speculation. Daffyd sent a quick warning to Sally to leave off the search and get back to the copter. She was there when he returned, easily eluding the searching muscle men who were as noisy mentally as they were physically.

"That audience is losing patience fast," Sally said, staring at the ominous black bulk of building. She was hugging herself against shivers of fear.

Daffyd looked eastward, saw the running lights of the slim Center transports.

"Not long now."

But too far away. Disappointment and whetted appetite rocketed to explosive heights. All along their side of the factory, exits burst open as part of the audience swarmed out in search of the singer. Inside, the furnishings were being thrown about and broken, people were slugging and slugged, trampled and hurt, as uncertain tempers erupted.

Daffyd wasted no time. He half-threw Sally into the copter, jammed in the rocket-lift, warning Sally to hang on. The head LEO copter blared its summons before he could turn on his distinctive identity lights. As it was, he only just got out of stun range.

Once clear of the busy altitudes, Daffyd hovered, calling an "abort" to the Center transports. The situation had gone beyond their capabilities. He'd only completed one circle before he saw that the LEO copters were laying gas. It was all they could do with such a mob starting to rampage. Sally was weeping softly as he veered eastward toward the Center.

"I wasn't honestly certain, Daffyd," Sally said, curled in a small contrite ball on the suspended couch in his quarters. She kept examining her glass as if the amber liqueur were fascinating. She'd the appearance of a small girl trying to get out of a scold. Actually her public mind was wide open to Daffyd, permitting him a review of her initial impressions of the singer. "I mean, while I couldn't think what else she might be there was the possibility that it was all sonic amplification. You know what a skilled operator can do."

"All the more reason you should have reported it, Sally. That kind of manipulation is why mechanical amplification is strictly licensed to reputable and reliable technicians."

"And not a clue about the girl?"

"Not yet." The licensed owners of The Fact were among those drowsily helpless inside the office in the lobby of the building. They'd be questioned, of course, by Gillings' men. Perpetrators of riots

could expect scant mercy from the LEO office.

"We've got to get to the girl first, Sally."

"If only I'd told you sooner . . ." Sally was floating in chagrin.

"I keep telling you, and every other member of my staff, I don't mind being bothered with so called 'trivia.' Because it isn't always as trivial as *you* might think it is."

"I know. I know. I simply wasn't thinking clearly." That was what she said, but what Sally was thinking, also for him to see, was that she hadn't wanted to disappoint him, or herself, in case her initial impression about the singer had been wrong. The girl had been almost too good to be true.

"Was she afraid of that crowd, Daffyd? It was three times the size of the one the other night. In fact, the size alone put me off."

"You first heard her . . ."

"Just two days ago. I tried to get backstage to see her . . ." Sally shrugged her failure.

"Muscle boys?"

"No." Sally was astonished. "Everyone else wanted to get next to her. I'd never have had a chance to find out for sure with so much interference, much less suggest she come to the Center."

Daffyd began to stroll about, his arms crossed over his chest, his head down.

"We both sensed her fright?"

Sally nodded.

"We are both agreed that she is a broadcasting empath?"

Sally nodded again, more emphatically. "Could she also receive? I mean, that would account for that 'echo' phenomenon, wouldn't it? She throws the emotions out and then magnifies them on retrieval?"

"That's one explanation."

"Hm-m-m, but you don't subscribe to it with any enthusiasm."

Daffyd grinned at Sally. "It doesn't fit all the circumstances. Besides, Roznine used a plural . . . 'those effing copouts'."

Sally's eyes rounded with surprise. "She links. That would account for the echo." Daffyd nodded. "Then who's the other empath?" Daffyd shrugged. "Doesn't she realize what she is?"

"Probably not. We shall have to inform her."

"And how do you plan to do that?"

"I think we should ask for Frank Gillings' help . . ."

"But . . . but . . . she started the riot! You know what happens to riot provokers."

"Yes, but I also know that Frank wants all Talented people registered, trained and controllable. So when he's had a chance to question the sleeping beauties . . ."

"We can trace Cinderella and fit her out with glass slippers . . ." Sally grinned saucily as she picked up the analogy.

"Before Pegasus flies away with her."

"Pegasus? He's a myth, not a fairy tale. That's not fair, Daffyd!"

"But the analogy is most apt," and op Owen was grimly serious. "And we've got to put a bridle on her Pegasus or she'll end up with singed wings."

Although the LEO commissioner and the director of Eastern American Parapsychological Center were on good working terms, the commissioner avoided coming to the Center. Respecting this whimsy, Daffyd called through to Gillings' office the next morning, asking for an appointment and specifying his business as The Fact riot.

"How did you happen to be there, Dave?" Gillings greeted him, rising from his chair as op Owen was ushered into his tower office.

Daffyd spent a moment admiring the 360-degree view of the sprawling, hazed metropolis.

"Tracking a rather unique Talent."

"That singer?" And Gillings swore when Daffyd nodded. "Do you know the toll on that caper?"

"No, but it's one helluva lot cheaper than it would have been if we hadn't alerted riot control."

Gillings frowned. "She shouldn't bé allowed a public performer's license."

"I wanted to find out if she had one."

Glaring, Gillings icily banged at his desk comset and demanded to be put through to ID. No license had been issued to anyone answering the description of the singer, Amalda; nor had there been a license issued to The Fact for solo entertaining. There were, however, specifications on record as to what mechanical amplification was permitted the management of The Fact, the frequency of the programming and the nights on which public gatherings could be held and the maximum number of people permitted to gather. Last night's performance, it transpired, was completely illegal. Gillings issued a summons for the owners, brothers named Dick and Harry Ditts who had told an entirely different tale the previous evening when they had recovered from sleepy gas. Five minutes later, Gillings was informed that neither Dick nor Harry Ditts could be located at their residences on record.

"Have they any known connection with Roznine?"

"Roznine?" Gillings regarded Daffyd with a combination of disgusted annoyance and startled concern which faded into deep reflection. "You saw him there?"

"Yes, he was at The Fact. When we were withdrawing from the scene of the imminent riot, he was deep in conversation with several types in the lobby. Later he spotted the LEO copters on their way in and made his way out. Funny he didn't suggest to the Ditts brothers that they leave with him."

"Don't be naïve. Roznine looks

after Roznine, first, last and always or I'd've had him cooled long ago. But Sector K is far from his bailiwick . . ." Gillings stared out across the city with narrowed eyes. "He's been getting too damned powerful in the city and not just with the Slavs. A megalomaniac is what he is and they operate with a curious ability to avoid minor disasters, until they get overconfident. Roznine hasn't made that mistake . . . yet."

"I shouldn't wonder that there's some Talent in a megalomaniac . . . apart from his madness."

"Talent?" Gillings erupted as Daffyd had known he would. "Christ, that's all I need is a Talented pan-ethnic leader. God damn it, why don't you people get on the ball and round up all these freaking Talents before they go haywire. We've got enough problems keeping that," and his blunt-fingered hand described a circle at the panoramic metropolis outside the plexi-glass, "from exploding as it is without unnatural hazards like latent Talents . . ."

"Then help us find Amalda. She can be immensely useful . . ."

"She's a riot provoker . . ." Gillings' eyes narrowed with a flash of vindictiveness.

"Are you going to help me, or hinder me, Frank? The girl is valuable to both of us but not in your cooler on an R.P. She's an intelligent broadcasting empath of tremendous range and power. I don't think she realizes what she is . . . or didn't until possibly last night. Something frightened her out of her wits halfway through her third song. She ran! I don't know what it was nor do I know exactly how she can broadcast the way she does, but it's imperative that the Center find and protect her."

Gillings' eyebrows rose in ironic surprise. "You and Iselin were there. Why didn't you get her then? What happened?"

"Among other things, a riot. Some people shield automatically, Frank, and if you can't trace the mind, you can't catch the body."

"All right, all right," Gillings said, irritably waving aside Daffyd's mild reproval. "But how come she doesn't know what she is? All right, all right. I know the answer to that, too. All right, what do I do?"

"I want a tracer on any young singer of her description applying for a performer's license anywhere in the country. And I want to know where she has sung, where she trained, where she came from. She's gone to cover and she won't find easy. In the first place, she's terrified of whatever hit her last night. And secondly, she'll have a good idea what happened when the audience found out she wasn't going to sing again. She has two very good reasons for making herself scarce. I also don't want her frightened out of her wits, so let me handle the search with my people. I'll get my propaganda team to al-

ter some of the public info broadcasts subliminally. We might get her to seek us out spontaneously, which would be preferable," Daffyd added, rising.

"O.K., you handle it, but I want that girl found and trained or whatever it is you do with them. And quick. I'll shunt the report on her to your computer. Shouldn't take long to trace her."

It took two days to trace the girl known as Amalda. And the printout had many gaps.

She'd been born and reared in a small Appalachian commune: educated to her sixteenth year in the county school system which she quit to "travel" . . . a not uncommon pattern for an undirected or unmotivated youngster. There was no record of formal music instruction but music was a feature in her environment. No official record of her for several years until she took work in a Florida food control complex. Two applications for a performer's license in Florida were denied by the audition board there. Third application was provisionally granted and lapsed without formal request for an extension, but several short-term engagements were on record for her as an unamplified, string-instrumented folk singer. A new application as apprentice, non-singer, had been filed in Washington, D.C. four months before: one engagement was listed without a termination date. Then Daffyd had a check made on the play in which she had appeared. Amalda, who had started as a walk-on, had been abruptly promoted to an important supporting role. The play was scheduled for a metropolitan opening in three weeks' time.

Although Daffyd had only a superficial acquaintance with the mechanics of the performing arts, there were several glaring contradictions in this report. And no explanation for Amalda's sudden appearance as a self-accompanied soloist in a minority entertainment hall of dubious reputation.

In the meantime, he and Sally worked with the propaganda department to include in the public information broadcasts a subliminal appeal for someone in Amalda's situation. Daffyd also got in touch with the play's producer.

"I've had enough trouble with that flitting bird," Norman Kabilov told op Owen. "If she does show up, I'll tell her straight: she gets no more contracts and she shouldn't ever hope to get a public performer's license approved. Not if I have any connections in the performing arts."

"What kind of trouble did you have with Amalda?" Daffyd asked, injecting placatory thoughts at the irritated little man.

"Troubles, plural, not trouble, singular." Norman Kabilov glowered at op Owen.

Daffyd knew the man was con-

siderably perplexed by the Center's interest in his ex-actress.

"First, she latches on to my stage manager, Red Vaden . . . good man, Vaden. Solid. Dependable. Only this little twit has him hopping to her tune like he'd never tried to brush off a stagestruck tail before. Red doesn't ask many favors so when he wants this bird in the cast—so when the show travels, he's not lacking what he's been having regular—I say, yes. What harm? Suddenly I got Red begging me to give her an audition for one of the secondary leads. I already got a good performing artist picked out for the part . . ." Kabilov's expression told Daffyd that his choice had been personal rather than professional. "But I gotta keep 'em happy so I audition the girl." The little producer frowned now, his thoughts vivid to Daffyd. The man had been surprised out of boredom at the quality of the audition and immediately signed Amalda for the role, despite the fact that he'd known he'd be in for a heavy time with the disappointed candidate. "Mind you, it wasn't that great a part until that kid reads it." Another headshake of perplexity. "I dunno how she did it because she sure had no theater arts credits but I couldn't *not* give her the part. And then the author comes to rehearsal and hell, he's rewriting the part to give her more. I damn near have a jeopardy action from Carla Jacobs, who's the name in the play. Only Red goes to work on *her* and she quiets down like a lily. And you gotta believe that Jacobs don't handle that easy. She's pushing fifty, y'see, and any new bird is a threat. Funny thing . . ." and Kabilov stared off above Daffyd's head, his mind taking up and discarding a hundred different glimpses of Carla Jacobs in high tantrum, Carla Jacobs soothed and very few snatches of Amalda. The man was unconsciously censoring those recollections. "Once La Jacobs got to working with the kid, things were O.K. Wanna see the reviews we got?"

Daffyd hastily assented but he was given no chance to do more than glance at the commendatory headlines in the facsimile sheets.

"As long as we were in Washington, it was O.K. But the minute we got to Jerhattan, troubles! La Jacobs storms in here with her lawyers and her current man and she won't play with that creature anymore. In fact, she gets so absolutely violent we gotta trank her. Now I can't lose La Jacobs or I lose the theater *and* the play since that's the contract. So I tell Red to find his bird another nest. I can't afford trouble. And they both walk!" He was indignant. "Just like that. He walks. A guy I'd have sworn was one hundred percent dependable walks out of the show two weeks before opening. On account of a scrawny bird!"

If Norman Kabilov looked the

picture of outraged innocence, he "sounded" like a man reprieved from an unknown ordeal. However, he did have publicity shots of Amalda and Red Vaden which he appeared relieved to give Daffyd: as if by getting rid of everything reminding him of this unsettling episode he could erase it from his memory.

Daffyd op Owen had his best finders scan the pictures, he sent copies to the LEO office and, on an off-chance, gave a final print to his best pre-cog.

"You better find that girl," Gillings told op Owen, "or I'll find her and make her answer—officially—for that riot."

"Frank, don't provoke another one."

Though the comset was not color, Daffyd was certain that Gillings' face changed shade.

"We're doing all we can," he went on soothingly, "to find her, but there's no way of forcing her to come to us."

Gillings growled something dire as he broke the connection.

There were days when Gillings was not Daffyd's only cross. He and Sally had spent most of the morning trying to figure out a way to attract Amalda to them. Lester Welch walked in, listened a few minutes and then snorted in disgust.

"Why don't you just find out where this Red Vaden lives? If he was so gone on the girl he'd leave a successful show, he's probably tied up tight with her. And if he's at leisure," and Lester grinned as he used the performing arts' euphemism, "he's surely checked into the P.A. Casting Agency."

Op Owen closed his eyes briefly before he thanked Lester.

"I'm not sure what we'd ever do without your common sense, Les."

The business manager snorted. "Oh, someone else'd tell you your nose is on your face." And he left.

"This is one time I wish I were a kinetic," Daffyd said with a wistful sigh, thinking all kinds of disasters, of a minor sort, to befall the dour New Englander on his way down the aisle to his own office. Then he caught Sally grinning at him, her eyes sparkling. "And if you repeat any of what I was thinking . . ."

She composed her face into solemnity, raising one hand. "Dai, you know I can't 'path that accurately." But in her mind was a vivid picture of Lester stuffed into one of his wastepaper baskets.

Daffyd placed a call to the casting agency. Bruce Vaden had reported his availability and a new address. However, the agency informed him, the address was naturally restricted. Daffyd explained who he was and that he urgently needed to get in touch with Vaden and was informed that Performing Artist Vaden would be contacted and would return his call if he were interested.

" 'If he were interested' indeed," Daffyd repeated, breaking the connection with uncharacteristic irritability.

"Shall we think Lesterish, and perhaps drop a word in the omnipotent ear of our local lion?"

Her suggestion elicited the needed address in five minutes and in less than half an hour, they were on their way by copter to an isolated area of the coast. The small sea-silvered cottage was tightly locked and obviously untenanted. Rather depressed, Sally and Daffyd returned to the Center. Lester met them at the roof stairs.

"You're covered with canary feathers," said Sally.

"I thought you couldn't read my mind," Lester replied, startled.

"With your expression I don't need to."

But Sally hesitated at the door of Daffyd's office. Rather more aggravated with circumstance than Sally, Daffyd took her firmly by the arm and pushed her into the room. He was instantly overwhelmed by several devastating impressions: contact with Sally informing him that her emotions were highly unstable: there were intense love-hate auras swirling in the room and among them the sure knowledge that the chestnut-haired girl seated facing the door was a powerful and violently agitated empath; that the red-bearded man standing by the window was linked to her in a desperate, despairing bond.

"I'm Daffyd op Owen," he said, "and this is Sally Iselin, head of our clinic recruiting team. We've been looking for you." Daffyd poured out waves of sympathy/reassurance/overt love and respect.

"*We* found you," replied the redhead. "I'm Bruce Vaden."

"We tried to locate you at The Fact last night," Daffyd said, turning to Amalda. His second impression was that the girl was about to implode.

At that point, Sally gasped and made a movement toward Amalda as the impact of fear/confusion/hatred/love/horror/revulsion/affection lapped over the two Talents.

"That's just a sample of what I can do." Despite a southern softness, the girl's voice grated in their ears and was echoed by an intense mental shout that caused both Daffyd and Sally to shake their heads. "I don't want this. It doesn't matter any more if Red is in or out of the room. It works anywhere now." She was drenched in bitterness, but there was pity as well as satisfaction to be read from her glance as she watched Sally beginning to shake with reaction.

Daffyd curtly gestured Sally from the room. She resisted until he reinforced the order mentally, telling her to get Jerry Frames, the Center's resident physician, over here on the double. He duly noted that she was rebellious and not both-

ering to hide the fact in her public mind or her expression. Daffyd winced slightly as Sally slammed the door behind her.

"You're an empath," Daffyd told Amalda, trying to reach through her broadcast to soothe her stampeding emotions.

"I don't care what I am. I want you to stop it. Now!"

"I can't stop it, my dear," he said in his kindest voice, but he had a vision of a bridleless winged horse bolting across the heavens.

Amalda rose, in a single fluid movement, her eyes blazing. "Then I will!" Her words rose to the edge of a scream as she launched herself at the window. Daffyd moved to intercept her, physically and mentally, but not as swiftly as Red Vaden. Not that she could have achieved her purpose since the window was unbreakable. So she hit the plastic hard and crumpled into the arms of the redhead, sobbing hysterically and broadcasting such conflicting and powerful emotions that, out of pity, Daffyd reached for the trank gun in his desk and shot her.

There was absolute silence on every level in the room as the two men stared down at the limp figure in Vaden's arms.

"I suppose that was necessary," the man said in a bleak voice as he swung her up in his arms.

Daffyd could read the relief in the man's mind, which had been bruised by confusion, fear and an unquestioning devotion to the girl. Op Owen gestured toward the couch.

"All right, op Owen, what now?" Vaden asked after he had arranged Amalda gently in a comfortable position. The man's eyes were a cold, clear, troubled blue.

Daffyd returned the gaze, probing deftly and finding in Vaden's outer thoughts that their visit here had been his suggestion, a last resort, since Amalda had been determined to end her Talent even if it meant taking her life.

"First we have the Center's doctor prescribe sedation," and Daffyd nodded toward the painfully thin arm of the unconscious girl, "and a decent diet."

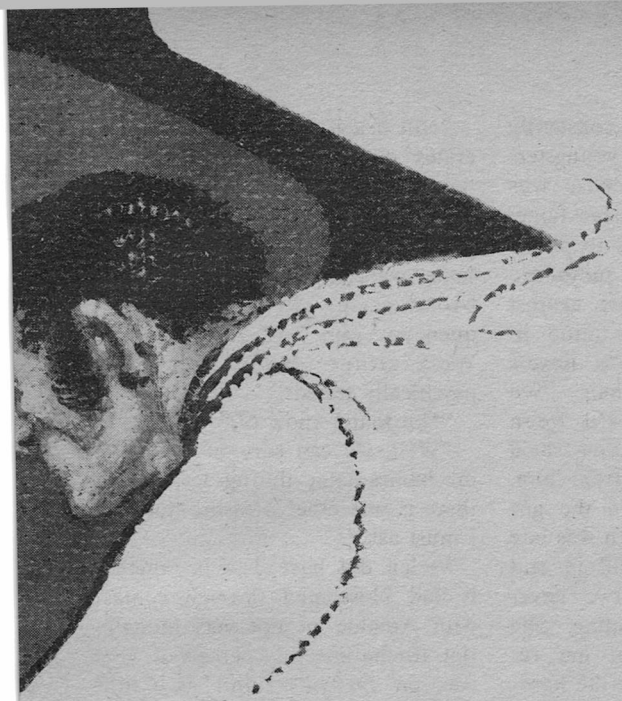
Vaden snorted as if practical advice was the last thing he'd expected from op Owen but he took the chair Daffyd indicated to him.

"Then the Center teaches her to control this Talent."

"Talent?" Vaden exploded. "Talent? It's an effing curse! After the other night, she's scared to go out of the house. She'll never perform again . . . she won't even . . ." and he clenched his teeth over what he'd been about to add but not before the thought, "audible" to Daffyd, made him pity the two more.

"Any Talent is a two-edged sword, Vaden," op Owen said, swinging his chair a little, a soothing motion.

"What kind of a freak is she?"



"She's by no means a freak," Daffyd answered in rather severe tones. "She's a broadcasting telempath . . ."

"And I'm the booster station?"

"I think that would be a good analogy."

"Look, op Owen, I've read a good bit about you Talents and nothing was said about what Amalda does . . ."

"Quite likely. We're just beginning to appreciate the mutations possible in the parapsychic. We have only one true telempath here. He unfortunately has no more mind than a rabbit and he only receives. Amalda can apparently transmit exactly what she chooses. I gather the phenomenon only began when she met you?"

On the top of Vaden's mind was the actual first meeting: a sort of dazed comprehension that they were "meant for each other." Their first lovemaking had been a revelation to the blasé, sex-wearied Vaden and each succeeding day had strengthened their interdependence.

"She was down and out," Vaden said aloud in an expressionless voice. What he wasn't saying was vividly and pictorially flashing across his mind, elaborating with every shade of the emotional spectrum a dry recital of fact. "Thank God it was me she approached . . ." and beyond the flashes of memories, Daffyd saw that Vaden had never allowed himself the luxury of loving or caring for anyone for fear of being hurt and used. In

a transient profession, constantly besieged by stage-struck youngsters who thought a P.A. license was "all" they needed to achieve fame, he had been invulnerable to physical charms and ordinary ploys. He had absolutely no defense against the impact of Amalda's mind in his. Now he ran nervous fingers through his crisp red hair. "We went everywhere." He'd been haunted with the fear that she'd leave him or be taken from him. "Even to rehearsal. Then the girl who was to play Charmian was late so I asked Amalda to fill in and read it till she came. I've never heard a better first reading. She even lost every trace of her regional accent and became the hard-voiced trollop. We all loathed her. It was such a total characterization! I've never seen such a thing in all the years I've been a P.A. I'd expect such expertise from someone like Mathes or Crusada but a novice? An ex-canary?" Vaden looked toward the unconscious girl and gave a sort of incredulous shrug. "She was so pleased to think she did have ability. She'd tried often enough to qualify as a vocalist." Vaden made an exasperated noise in his throat. "The first time she sang for me I couldn't credit that she'd been refused a license." He turned back to Daffyd. "It just didn't make sense."

"I'd hazard that you were the missing factor."

"A modern Svengali?"

"Not exactly. But the brain generates electrical currents. And in the same way that a receiver must be tuned to a certain wavelength to get a message broadcast on that same wavelength, minds must be broadcasting on the same frequency. Yours and Amalda's are. Were either of you ever parapsychically tested?"

"Not that I know of."

"Well, we can sort out the pure mechanics later during testing but there is one other pressing question I must ask."

Vaden did have Talent, whether it had blossomed through contact with Amalda or not was immaterial, for he instantly perceived what was on Daffyd's mind and stiffened. Daffyd continued, feeling it wiser not to let Vaden realize that he was in the presence of a strong telepath . . . at least not yet.

"Granted you serve in the capacity of an amplifier for whatever mood Amalda creates, what happened the other night at The Fact? What terrified her so that she fled from what was obviously a smash-success? She had that audience in the palm of her hand."

An expression akin to terror crossed Vaden's face, ruthlessly suppressed in a second.

"You were in the audience?" Vaden asked, temporizing.

"Yes, Sally Iselin had heard Amalda two nights before and wanted me to confirm her suspicion that Amalda was a high-gain em-

pathist. What scared Amalda off that stage? And sent both of you into hiding?"

There was nothing helpful in Vaden's mind except a repetition of what Daffyd and Sally had felt in Amalda's projection. Instead, Vaden's thoughts became despairing.

"That's why you've got to help us, op Owen. Turn Amalda off!"

Vaden didn't attempt to disguise his fear now. And he didn't strike op Owen as easily frightened. He was tough, able to take care of himself from the look of his bear-like build. And had taken care of himself, to judge by the scars on his knuckles and face.

"Fortunately, no one can turn Amalda off. Nor do I yet see the necessity." Only a nebulous but overwhelming fear in both Vaden and Amalda.

"You'd better see," Vaden cried, leaning urgently toward op Owen. His eyes were blazing with anger, fear and a sense of impotence which would be more frightening and humiliating to a man of Vaden's temperament. "You'd better see that it's crushing Amalda to the point where she was willing to commit suicide rather than live with what she's become!"

"You haven't told me what frightened her and what, if I may speak candidly, is bothering you as well."

Vaden got a grip on his fear and anger. "There was someone else in the audience," he said in a harsh controlled voice, "who suddenly linked up with us. Someone who was trying to dominate. Who was determined to control what Amalda can do. She got the brunt of it, of course, then I caught it."

Op Owen was already certain, with an awful instinct, that Roznine was the third person. He managed to smile reassuringly at Bruce Vaden. He swung his chair idly from side to side with counterfeit unconcern. He had lost Solange Boshe but he wouldn't lose Amalda . . . and Vaden . . . *and* Roznine.

"That's very interesting," he told Vaden. "Does Amalda have any idea at all about this man's identity?"

"How could she?" Red Vaden asked scornfully. He was making a notable effort to cover his inner perturbations. He couldn't bear even the notion of sharing Amalda with anyone. "The minute she realized what was happening, how strong the guy was, and what he wanted her to do, she made as if she was taking a short break. And told me to follow. But she won't ever sing again. You don't know what it does to you . . ."

"I probably more than any man," Daffyd said with a slight smile.

Vaden discredited the statement with a cutting sweep of his hand.

"You've got to understand that Amalda must be turned off."

There was an edge in his voice now: he was hitting an emotional

high, too. Daffyd reached surreptitiously for the trank gun.

"Don't you dare!" Vaden moved with surprising speed and grabbed op Owen's hand.

"I thought you'd understand, op Owen. Whoever that guy is he's double dangerous!"

"You'll have every bit of protection the Center and every other Center in the world can offer you, Vaden," Daffyd replied, allowing his voice to take on strength without volume. "Which is not inconsiderable, I assure you. What *you* don't understand, Vaden, is that Amalda's main problem is simply lack of control of her rather breathtaking ability."

"*You* don't understand." Vaden was desperate. "She can control masses of people. Those subbies in The Fact . . . she could have made them do anything. That's what's terrifying her. And me. And that other freaked-out mind . . . *he* wanted to *use* her to control that kind of a dangerous mob. God, man, I know what riot is. I've seen them. I've been caught in them. I know what happens. She could *cause* one. She even started one by not being there. She could incite the entire God-damned Jerhattan complex . . ."

"How?" asked Daffyd blandly.

"By . . . by . . . doing what that mind wanted her to do the other night."

"But," and Daffyd matched Red Vaden's urgency with his own, "she didn't! And she couldn't! And nothing in this world, not even some freaked-out mind with a megalomaniacal bent could make her. And once she's learned to control this . . . winged horse of hers, I think you'll all find this not so cursed a Talent."

"I don't believe you."

"How old is Amalda?"

"What? What has that got to do with anything?"

"How old?"

"She's twenty-two. . . ."

"Twenty-two. And rather young for twenty-two, I should imagine. That's still a tender age." Daffyd could've wished for some of Amalda's empathic strength, but he was getting through to Vaden's basic reasonableness. "And she has become emotionally involved with you . . . no offense, please, Mr. Vaden. From a rather humdrum frustrating existence, she has erupted onto the stage, into prominence. Even a mature personality could be dazzled. Then she is thrown into a situation—the concert at The Fact—it was unnerving for me to be an observer, and I'm well in command of my emotional responses. She is frightened and runs! For which I don't blame her at all. In short, Amalda has been operating on high for some time. We are still frail masters of our powers, Mr. Vaden. And that receiver/broadcaster unit which is Amalda is overcharged.

"No, Mr. Vaden, we can't turn

her off. We don't want to. But we can teach her how to channel her Talent, how to discipline it so it won't run away with her as it has just done. We can also show you how to help her put on the brakes. Oh, yes, you can apply what, to all intents and purposes, are circuit breakers. She will need your strength and aggression, Mr. Vaden. In fact, and this is between us, Amalda is not as important as both of you. So I will consider you a team, because that's what you are."

"Then you can help?" asked Vaden. He didn't quite believe op Owen but the aura of belligerent desperation was fading.

"I just said so."

"No," and Vaden shook his head angrily as if he'd thought Daffyd would "know" his exact reference.

"Emotion is as much a tool as a pen or a pneumatic drill . . ."

Vaden stared at him, and then unexpectedly chuckled. "And Amalda's been swinging the drill?"

Inwardly op Owen cheered. Thank God the man had a sense of humor.

"Exactly. Amalda has all the finesse of a tyro. If you had been the focus instead of this rather impressionable and previously frustrated young woman, I think matters might have progressed more circumspectly. As it was . . ."

"I don't think Amalda's going to believe you, op Owen," Vaden said, looking sadly down at the unconscious girl.

"I don't think she'll have any alternative," Daffyd replied severely. Vaden frowned, his eyes narrowing, but op Owen returned the look, adding a mental reinforcement. "She is exhausted from the look of her, which is what happens when you run an engine on full power for any length of time. We'll sedate her sufficiently to let her body and mind rest. And we'll keep her sedated until she begins to realize that she cannot control everything around her with the grip of a tyrant . . . for that seems to be her main fear. Rather commendable, actually."

"And?" Vaden said in a flat, no argument voice.

"And, in the meantime, you will have to learn how to aid her. You've been more or less passive. Shall we say," and Daffyd smiled slightly as he bowed to Vaden, "you are both engaged for a long-term contract with no options."

The door burst open to admit Jerry Frames, the Center's physician, and Sally Iselin, who glared her way back into the office. Daffyd smiled as he stepped aside to let them through to Amalda.

"What took you so long?" he asked Sally.

"What d'you think I am? A lousy pop Talent?"

"She's able to cover completely now, Daffyd," Sally said with understandable pride.

They were watching through the

one-way mirror as Amalda fed Harold Orley. The witless empath was neatly eating, with appetite, and often a small smile of pleasure on his childlike features.

"Never thought we'd use Harold as an instructor," said op Owen. Sally grinned at him, her eyes sparkling. "Harold's a useful old tool."

Daffyd thought fleetingly of Solange Boshe.

"Don't, Dai!" Sally's one word was reinforced by her mental command behind which Daffyd sensed sympathy, pity and, oddly enough, annoyance.

"She's off all tranks now?" he asked, grateful to her.

"Heavens yes. She's got to concentrate on Harold, you know."

"Then let's start them moving about outside."

"I would if I were you. The Red Bear's about to go stir crazy."

"Red Bear?"

Sally wrinkled her nose. "That's what I call Vaden."

"Then Amalda's Goldilocks?"

"Good heavens, no. She's Cinderella, remember?"

"Cinderella and the one bear?"

"Cinderella, the one bear and . . . the wolf!"

Daffyd frowned. "I thought I was a better therapist than that."

"Oh, it's just a back-of-the-mind worry. She's not going to trust herself until she does meet, and vanquish, the wolf. And then we can all live happily ever after."

There was a tinge of bitterness in Sally's bright voice that made Daffyd look at her closely. He was tempted to probe but that wasn't ethical, particularly since Sally would be instantly aware of the intrusion. So he observed Amalda for a few more moments before leaving the clinic.

In the month Amalda had been at the Center, the over-thin, intense girl-child had been replaced by a still slender but composed young woman. Her fears had slowly been eased by Daffyd's adroit therapy and by her own ability to discipline her emotions, to channel the vital energies deftly.

The first sessions with Harold Orley had been conducted with Amalda fairly well sedated. The girl had been revolted by Harold's witlessness. There could have been no clearer mirror for her reaction. Pity for the moronic empath had been quickly suppressed because Harold would disconcertingly burst into tears. At first Amalda had rebelled at being forced to work with Harold but she could not refute the fact that he would react instantly to her emotions, and until she could control them in his presence, she couldn't expect to be able to control them sufficiently in public.

In the first days at the Center, she had also demanded, even under heavy sedation, to be lobotomized: an operation which Amalda erroneously supposed would suppress her gratuitous Talent. Then she met Harold and realized that the psi-

onic portion of her brain would not be excised by such an operation.

Step two in Amalda's rehabilitation was her introduction to the Center's star young Talent, two-year-old Dorotea Horvath. It didn't take Amalda long to recognize the lesson which was thus demonstrated to her.

Dorotea's mother brought her to the clinic every morning and afternoon, as soon as she woke up from her naps. There were appropriate toys and games stashed here and there about the room, which was usually full of applicants—upwards of fifty a day, all of whom thought they were waiting for Sally. Dorotea would make her rounds, playing contentedly. In thus circulating the room, she would instinctively approach anyone with the least vestige of Talent, and it was only to such applicants that Sally gave the deeper testing. The others could be dismissed after routine examination, none the wiser for the preselection. Dorotea was blissfully unaware of what she could do—she simply did it. Her function with regard to Amalda was somewhat different.

Small Dorotea was playing contentedly with six-sided blocks. When they tumbled, her fury exploded . . . to be checked, unconsciously but firmly, by her mother. The young telepath's thoughts were so loud and clear that Amalda couldn't fail to recognize the analogy.

"So I discovered a bright new toy in my mind and it won't play with me, is that it?"

"You have to learn to balance the toy just as Dorotea does . . ." Daffyd said gently.

"So they won't all fall down and go boom?"

"With you underneath," added Sally. "Like the night at The Fact."

Despite sedation, Amalda paled and shuddered.

"He can't find me, can he?"

"Not here, behind shielded walls, my dear," Daffyd reassured her.

Once Amalda could control her emotions, Vaden began to take part in the exercises. It was during these sessions that the phenomenon of the second Fact concert was harnessed. Amalda with Red could dominate the emotional atmosphere of any large room, could perfect, even to the minds of sensitives, any emotion she chose. But the force that Daffyd and Sally had felt at The Fact was absent.

"The team right now is limited." Daffyd said to Sally, somewhat ruefully.

"Limited?" Sally was surprised.

"Yes. As long as there are no dark emotions being counter-broadcast, she can project what she wants of the lighter ones. But I was rather hoping that she and Vaden would be strong enough together to counteract . . ."

"An incipient riot?"

"Yes," and Daffyd leaned forward eagerly. "That would placate

Frank Gillings and wipe out that R.P. he's still got against her. And think what it would mean in riot-control techniques: two people instead of twenty sensitives, if we have 'em available when we need 'em, or instead of the gas."

"Well, so that's what you've had in mind."

"As it is, I think we'll let them operate as a team in those gatherings that tend to develop brawls: conventions, fairs, industrial shows."

"And what about the wolf?"

"Ah, yes, but you see, I want him to come out of the woods."

"And Amalda?" Sally "sounded" furious with him.

"Which would you wager on? A wolf or a bear?"

Daffyd op Owen was by no means as callous of Amalda's safety as Sally might think, for he'd circulated a warning to all sensitives for any inquiry about Amalda or Bruce Vaden and any unusual activity on Roznine's part. Ted Lewis, the chief police Talent, gave them their first hint of interest. A well-known and respected performer's agent who just happened to be Polish, asked for assistance from Central Casting to find a missing P.A., Bruce "Red" Vaden, who was reportedly employed but who had obviously not appeared with any working company.

"Now that could be legit," Ted Lewis told Daffyd. "The guy really is forming up a variety show for the Borscht circuit but for that he doesn't need a stage director with Vaden's rating."

"What about an unamplified folk singer?"

Ted Lewis shook his head. "Now Roznine may have found out that Amalda is Vaden's bird but it's also fairly common knowledge that Gillings is still after the folk singer who started the riot at The Fact. Stupid Roznine isn't. Devious, yes."

Gillings had not dropped that charge yet, which suited Daffyd; for, while Amalda was recovering herself and learning to control her abilities, the charge would provide her with a certain protection.

What did puzzle Daffyd was what Roznine intended doing with Amalda if and when he got possession of her. To be sure, the public was informed, in broad terms, about the capabilities of the Talented but nothing had ever been released about the more bizarre possibilities of psionic powers. Certainly nothing related to Amalda's ability, for the very good reason that until Amalda had met Bruce Vaden, such a Talent couldn't even have been conjectured as possible. Therefore, what could Roznine's active imagination have suggested to him? Did he realize that he, Roznine, was Talented? Since he had domination over his ethnic group, did he plan to dominate the entire city through Amalda?

"Vsevolod Roznine is no man's

fool, boss," Ted Lewis was saying to Daffyd's further agitation. "He's got every single employment and patronage plum available for his Slavs. Oh, all very legal; a bit dicey if you're looking at it from some other ethnic corner, but legal. And he's fast moving out of his own bailiwick. He's been getting cooperation where no Pan-Slav has ever got it before. How, why, what he does, we don't know. He may have a common garden variety of blackmail or he may even have a genuine Talent. Though Gillings'll flip if he's got to deal with a Talented ethnic leader!"

"There could be worse things," Daffyd said, though obviously Ted Lewis wouldn't agree. "Have you got the LEO pre-cogs sensitive to both Roznine and Amalda?"

Ted Lewis shot his superior a disgusted look. "They're all sleeping on papered pillows."

"And?"

"Boss, you know you can't force a valid pre-cog."

"No incidents at all?"

"Nary a one. Only vague feelings of uneasiness." He was evidently repeating a frequent reply, which satisfied him no more than it did Daffyd.

"Keep an open mind on Roznine. And don't let Gillings know we suspect Roznine is Talented. I'm going to start using Amalda and Vaden as a team. Sooner or later Roznine will discover her again."

"You want that to happen?"

"Very much." And in Daffyd's mind as he left Ted Lewis was the memory of Solange Boshe's wild demented face before she teleported through a steel door in the parking building.

Gillings was delighted to use Amalda and Bruce Vaden for riot prevention. He even offered to take the charge off the books but Daffyd suggested that it remain a while longer. The team was instantly assigned to a round of rallies, meetings, conferences, and conventions. Such gatherings were encouraged to divert a population with too much unoccupied time, but any one of them might explode into a riot, given the proper stimuli. Decibel alarms were legally required in every meeting hall, including churches, but clever agitators could and had sabotaged them so that the suppressant gases were not released when the "noise" level reached the sharp pitch of incipient riot.

These same professional agitators had also learned how to modulate their voices below the danger level, carefully goading their victims into the spontaneous combustion which neither gas nor water jets could control. And which no pre-cog could be expected to predict until too late for effective action.

Fortuitously, as Amalda learned to control herself, she learned to

read Harold with an accuracy and perception that surpassed Sally's. Harold could serve with the team, Daffyd decided, as a gauge for the general atmosphere of a group and as, in an emergency, a body guard for Amalda. (You learned things, even from disasters, Daffyd told himself positively.) Partnered with the empath, Amalda would sit in the center of an audience or circulate through a crowd. Vaden would be on the periphery, ready to "broadcast" if it should become necessary.

They could also be expected to keep up a running projection of whatever aura the LEO authorities or the sponsors of the occasion requested, if this were not a commercial affair. Subliminal pressures for mercantile purposes were, of course, an illegal and unethical use of Talent.

The team was extraordinarily successful in unexpected ways. The Motorboat Show had the lowest incidence of petty pilfering in its history; the Home Show reported no lost children and a remarkably quiet, well-behaved quota of siblings following their parents through the exhibits. Two conventions, noted for the inebriation of their members, had their damage deposits reduced as a result of genial but undestructive behavior of the crowds at these particular conventions.

And Amalda began to gain confidence to the point where Sally remarked that even Bruce Vaden had been seen to smile occasionally.

I was surely right about the menu today, Amalda thought as the waiter plunked down the mock chicken, lumpy reconstituted potatoes and shriveled snap beans. *Oh, well, all part of Life's Rich Pageant,* she added, and started broadcasting recklessly intense delicious taste feelings. Harold began to beam beside her, attacking his food with relish.

She glanced casually around at her table mates, as pompous a crew of convention goers as she'd ever seen and she was now an authority. (Did they always use the same "masks" at conventions? Or could it be the same group of people as the Plastic Container Manufacturers last week, and the Fabric Finishers Association on Tuesday-week?) They responded to her prompting as rapidly as Harold, all grunting with pleasure as they ate their cardboard food. Amalda sighed. Too bad she and Bruce couldn't get a kickback from the catering staff for "improving" their food beyond the call of duty.

Now there I go again, she thought, *but it does seem that the Talented are letting an awful good thing go the way of Duty and Honor.*

She was rather pleased with her broadcasting today. She had begun to bother with such fine points in their assignments, more to amuse

herself at first–like stopping all those kids from whining at the Boat Fair. But it had sounded like home, all her brothers and sisters whining at once, before they'd tied Ma off. If she never heard another child whine it would be soon enough. And making food at least "seem" tasty was in defense of her poor abused digestion. According to specifications, all the nutrients and vitamins were in the food and would be absorbed by her system. But she'd come to prefer "tasting" things. It made these convention luncheons bearable. What a way to earn a living!

And yet, Amalda reluctantly admitted, she didn't dislike it. If only . . . she wouldn't think about that. It'd ruin her appetite. After all, now she'd got the hang of this trick mind of hers, she could make whole bunches of people feel what she wanted them to. When the time came, she could control *him*, too. Bruce was never far from her. She smiled, the warmth of his infinite love a presence to counteract any nibble of fear. Sometimes when Bruce made love to her, she wanted to embrace the whole world with its beauty but that sort of broadcasting wasn't even moral: that was private between her and Bruce and . . . *He'd* thought things at her that night . . . things she didn't even dare to think about, things . . .

Harold was getting restless. She curbed her reminiscences.

And then, the jab. So sharp she gasped, so hard it was physical yet the prod was in her mind . . . and all too familiar. *He* was here.

Harold whimpered, empathizing with her. She hastily damped down her shock of fearful surprise. *He* was as abruptly gone from her mind. She shivered, unable to suppress the lingering sense of revulsion that the recognition touch evoked in her. She overcame the feeling, smiling inanely around at her table mates. She patted Harold soothingly on the arm. He grinned, restored to equilibrium. Good, she must keep this to herself.

But she couldn't keep from glancing around for Bruce: he was at table four, near the dignitaries. He glanced up, nodded at her, and was then required to make some answer to his partner, a female who simpered up to him.

Sometimes, Amalda thought, *Red has the harder role to play.*

Part of her mind wanted to search for *him*, but her strongest desire was never to be touched by *him* again, ever. She scanned the room now, certain she'd be able to locate his evil self. She'd certainly studied his ID's long enough to spot him physically anywhere. Waiters were coming and going from the kitchens. He wasn't one of them. He wouldn't be one of the conventioneers. She'd've identified him long before now. She opened her mind, making it, as Dave had suggested, like the lens of a cam-

era, slowly widening. She didn't really want to: too much of an appalling and revolting nature seeped in. She wondered how Dave, who was a full telepath and "heard" actual thoughts, not just emotions as she did, could bear it. She wondered how much he had "conditioned" her mind to accept her Talent. She knew he had: he'd told her so. She didn't mind . . . probably Dave had done that, too. But he was so kind. Now if only he would . . .

No, she told herself sternly, *these thoughts you may not have. Sally loves Daffyd op Owen.* She grimaced. For a perceptive Talent, Dave could be awfully dense. For the Lord's sake, you didn't even have to be a telepath to see Sally Iselin was madly in love with him. Or maybe Dave knew and couldn't do anything about it? Couldn't someone condition Dave? *Hm-m-m. Maybe I'll get to work on it. No,* and Amalda gave her head a little regretful shake, *that would be tampering and that's not ethical.*

She sighed. Being a Talent imposed certain rules and regulations which absolutely couldn't be broken. In the first place, you got found out too fast. Not much of a bridle on that winged horse Dave was always talking about but it did keep you from falling off . . . morally . . .

The waiter was bending over her. Amalda leaned toward Harold to permit the waiter to remove her plate. Instead he mumbled something.

"I'm sorry. I didn't hear you," she said, smiling up at him.

He gave her a stare and said something in the same unintelligible mumble. She could, however, sense his urgency. He had something she must do?

"I'm really very sorry, but would you repeat your question?" She gestured at the chattering diners by way of explanation.

The little man looked angry. In a clear voice, he asked the waiter at the next table to join him.

"I ask her a simple question and she gives me this so-sorry routine," he said. But he was incensed about something. And his urgency intensified.

"Really, there's so much noise," Amalda said.

The second waiter, a burly man, gave her a fierce scowl.

"What's your problem, miss? You got delusions? Ain't you conventioneers satisfied with nothing? Do like he says and there'll be no trouble."

"I certainly don't want to cause trouble." And Amalda began to broadcast soothing thoughts.

Suddenly a third man was pulling her chair from under her and the first two had her by the arms.

"You just come with us, miss. You just come with us."

They were scared: they were prompted by an urgency which was unnatural and artificially induced.

He had instigated their actions.

She got Harold to his feet: the poor witless fool was momentarily as confused as she was. She felt Bruce reacting. But she was being physically manhandled away from the table by the two waiters. If they did get her out of the hall . . . it wasn't that far to the kitchen entrance . . . Amalda tried to keep from panicking. The next thing she knew Harold reached out and grabbed the waiters by the shoulders, had torn their hands from her arms and banged their heads together.

Then Bruce and two officials closed in on the knot of people and somehow the unconscious waiters were being whisked from the banquet hall.

"Calm 'em, Mally," Bruce hissed at her, and she began to pour out such sweetness and light that everyone at her table stopped eating to beam at each other. She modified the broadcast, got Harold and herself reseated. She even managed to keep her trembling reaction inward so that none of it boiled over to erase the idiotic smile from Harold Orley's face.

By the time the luncheon ended, however, the effort began to tell on her and was reflected in Harold's nervousness. She felt physically drained. What if *he* had been able to get her away before Harold could react? Before Bruce, on the other side of the hall, had been able to get to her? Supposing *he* had . . .

Bruce was at her side, his face set and determined. She knew that look. But now she was afraid of leaving the semi-protection of so many people. If he had actually tried to kidnap her in the middle of a convention . . .

A plainclothes LEO man was bearing down on them. She rose, smiling brightly. Harold twitched his hulk to his feet, but his brow was clouding with childlike anxiety.

Disgust at her spinelessness buoyed Amalda's weakening knees. The instant Red put his arm around her protectingly, she almost crawled into him.

"Let's get her out of here," Red said and gestured the LEO man to lead Harold.

"Come this way," the LEO man said, gesturing to the draperies at the side of the huge banquet hall. A door in the paneling gave onto a small anteroom. "The Waiters' Union is screaming over those busted skulls. We got to get you out of here quietly. What'n hell did happen, Amalda?"

"I don't quite know," she murmured, aware that exhaustion was overcoming mental resolve. "Is it all right to leave?" She looked back over her shoulder at the diners dispersing slowly.

"The hell with them," Bruce said in a savage voice.

"I'm so sorry. So sorry." Amalda had a sense of failure. The first

time she came up against *him* again she had fallen apart. She wanted to cry. She was a failure. After all Daffyd and the others had done to help her . . . to swoon like any vapid female . . .

I'll get you. I'll get you the next time. The voice was as loud in her ears as Bruce's exclamation.

"Bruce . . ."

Charlie Moorfield came through Daffyd's door without bothering to knock.

"They did it," he cried, halting his forward momentum just short of gouging his thighs on the desk edge.

Daffyd picked up the images so vivid in Charlie's mind, and despite the fact that he could also perceive that the emergency was over, he sprang to his feet.

"Who did what?" demanded Sally, excitedly. She wasn't accurate enough to 'path the sequence.

"They tried to snatch Amalda at the Morcam Convention luncheon," Daffyd told her.

"Only she got Harold to bash their skulls in."

Sally gasped.

"Gillings said the attempt and the arrest were handled so quickly that no one at the table with Amalda and Harold know what happened," Charlie went on. "Waiters' Union is screaming over the quote unwarranted unquote arrest of three members. There's hell to pay."

"Not necessarily," said Lester, but he was glowering as he walked into the room and carefully closed the door behind him. "This is a clear case of professional immunity."

"How do you construe that?" Daffyd asked.

Lester sighed as he regarded his boss with a tolerant expression.

"Amalda is a registered Talent, right? She was present at the luncheon in a professional capacity. Therefore no one, not anybody, has the right to interfere. The waiters did, by trying to remove her from the hall. They broke the law. Amalda hasn't. Neither has Harold. Even if he was a little overzealous, he is now protected from the consequences of his Talent."

"Wait a minute, Lester," Charlie said, "that immunity law only means that you can't get sued when you're working . . ."

"It also means," and Lester waggled a bony finger at Charlie and Daffyd in turn, "according to the way Senator Joel Andres and our legal eagles interpreted it to *me,* that any citizen attempting to interfere with a registered Talent's performance of his duty is violating that law."

"This would be the first time we've had to invoke the law," Daffyd said.

Lester raised his eyebrows in surprised alarm. "So what's wrong with that? Or did you break your . . ." he glanced abruptly at Sally who stifled her laugh . . . "your

bones arranging protection *not* to use it?"

Op Owen made a cut-off gesture with one hand. Lester Welch muttered in disgust.

"I thought by this time you'd've learned the cost of idealism, Dave," the business manager said. "We sweated out that Bill: it damned near cost us Joel Andres' life; we have a clear case of an infraction and by God's little chickens, you're going to invoke it. If Gillings hasn't already."

The comset on Daffyd's desk lit up, flashing red. He pushed the toggle down.

"Commissioner Gillings, sir, urgently."

Daffyd nodded acceptance.

"Op Owen, we're getting a lot of static from the Waiters' Union, about Amalda, false arrest and all that crap," Gillings stated with no preamble. "So far I've played it that their member was pushing a lust act and got told to bug off: that the lady-in-question is sufficiently upset to invoke female citizen's rights. Then we got the honest-employees, good-union-men-with-clean-sex-records and she's-a-pervert-after-the-damages claim." Gillings sighed with heavy disgust. "You know, the usual convention static. Now, we can clear all this up by invoking the Professional Immunity Act but . . ." and Gillings waggled a thick finger at Daffyd, "I'm not all that eager to break the team's cover. Bruce Vaden told my men that something had scared Amalda and the only thing I know of she's scared about is what happened at The Fact. Was there a repeat at the Morcam?"

"I haven't talked to Amalda yet, Frank," Daffyd said. "I assume she's on her way back here with Vaden?" Gillings nodded. "Give me a little time."

"Don't take too much. That Waiters' Union packs quite a wallop."

As soon as the commissioner's face had faded from the screen, Daffyd asked for Ted Lewis in the LEO Block.

"Ted, you heard about the snatch attempt on Amalda?"

"It's all over the place. Say, why don't you just invoke the Immunity Act . . . No?" Ted was as perplexed as Lester.

"Is Roznine involved in any way in the Waiters' Union?"

"Hell, yes. There isn't one union he isn't involved with right now."

"Any chance of finding out if he was at the Morcam Convention Hotel this afternoon?"

Ted Lewis held up a hand, flicked on another switch, his words and the reply indistinct being off the receiver limit of the comscreen. He looked more confused.

"We've had Croner sort of keeping him under the eye/ear. Croner says he's at a Tri-D on Market and Hall. Huh, how's that, Croner? Hey, boss, Roznine has been watching a lot of Tri-D lately."

"Then he suspects he's been under surveillance and is ducking out the other exit of the Tri-D. Fine." This was an unsettling development because it could mean that Roznine was developing as a Talent. If he got pushed too hard. . . . op Owen shuddered. "Let's go see Amalda."

"It was *him*," Amalda told Daffyd. She looked white, shaken and small as she huddled against Red Vaden on the couch in the living room of their suite.

"How close to you?"

She shook her head. "He wasn't in the room. I'd've seen him. But he was near enough to recognize me. My mind, I mean." She gave a delicate shudder. Had he recognized her because she'd been thinking those thoughts about him? She wanted to ask Daffyd but she didn't dare. She'd let him down enough already.

"Were you aware of anything, Red?" Daffyd asked.

"Not at first. Then only Amalda's surprise. I looked up and saw the waiters grabbing her. But before I could get across the room, Harold had acted." There was admiration on Vaden's face for the maneuver. "I should apologize to the guy. I think we got things quieted down before any of the convention crowd got wise."

"After the attempt, were you aware of Roznine's mind, Amalda?"

"Not until we were leaving the hall." She closed her eyes. "He said, 'I'll get you. The next time I'll get you'."

Daffyd looked questioningly at Red, who shook his head.

Had you ever received words before, Amalda? Daffyd asked.

Amalda looked at him startled and then shook her head, smiling shyly. "Only from you. Before now." She was aware of his concern. "That's bad, ain't it?" she asked, her soft southern inflection intensifying her regret.

"Not necessarily. We have a problem," he began, choosing his words carefully. "We know that Roznine would like to . . . get you, Amalda, to accomplish his own ends which, knowing your capability, must be illegal control of people's emotions. We have to assume he's trying to locate you. We must also assume that he may not realize that Bruce is part of your ability. And that's a link that can and will protect you, Amalda." Daffyd reinforced that notion with a stern telepathic voice. "Roznine couldn't succeed in kidnapping you today, could he? Well, he damned well won't be able to anywhere else either."

"You can't be sure of that, Daffyd," she said in a very small scared voice.

"I don't intend to put it to the test, Amalda," Daffyd continued smoothly, smiling at the apprehensive girl, "but kindly remember that you have successfully eluded

him twice now: once by running away and hiding—successfully. And today by direct action against his agents."

Amalda slowly nodded her head in agreement.

"Now, while Roznine is keen to get his hands on you, we . . . and I include the commissioner . . . are very anxious to get Roznine."

It was Bruce Vaden who stiffened and looked with an intensity close to hatred at Daffyd op Owen. The telepath returned that look calmly, knowing in that exchange that Vaden understood the implication even if Amalda didn't.

"Roznine is obviously a latent Talent. We know he fits minds with Amalda. We don't know what else he can do, and he is in a peculiarly sensitive position in the ethnic situation of this city: in a position to do a lot of damage or a lot of good. We can't push him too far and we can't let him go. We do want him—preferably on his own initiative as you did—to come to the Center. You know what it's like to have an unmanageable Talent, both of you . . ."

Daffyd was speaking more to Bruce Vaden than Amalda but it was the girl who answered.

"It's awful . . . awful lonely, awful wonderful." She gave Daffyd a smile, tremulous, and though she held her chin up in an attitude of confidence, he could see the indecision and fear of her mind.

"Now," he went on briskly, "in using the Waiters' Union to snag you, Roznine has put us in a difficult position: we can easily use the Professional Immunity Act to protect you but that would necessitate your appearance in court. And believe me, everyone interested in our cover agents would be there to identify you. Your team usefulness would decrease . . ."

"Does *Amalda* have to appear in court?" asked Red suddenly.

"Well, yes. Oh, I see what you mean," and Daffyd started to grin. He managed to keep his smile normal despite what he had read in Bruce Vaden's mind under the cover of the constructive suggestion. "Very good point. Two ways. Yes, I suppose we could make Amalda up to look different . . . or we could have a stand-in for her. In that case, Amalda would have to be physically present because Roznine would be there and he'd know if she weren't present, which could score against us if an electroencephalogram reading is requested by the prosecution. Hm-m-m. Good notion."

"What can Roznine hope to achieve by forcing us into court?" asked Red. He was trying to cover his earlier thoughts before they became apparent to Daffyd. Present now was a thread of hopelessness, a presentiment that the intense happiness and rapport that Bruce Vaden had enjoyed with Amalda was to be sundered: too good to

last. Daffyd could only answer the spoken question.

"Now that has me stumped," he said and meant it on several levels.

"Stand-in?" Gillings appeared to reject the stratagem instantly, and just as abruptly, he frowned thoughtfully. "Why? You don't think anyone would be crazy enough to try and snatch Amalda in court, do you? Although . . ." he glanced over at the windows, "the atmosphere is damned unstable . . ."

"I know," Daffyd agreed. Even during the short copter flight to the LEO Block, he'd been aware of the pervasive "darkness" of the city's emotional aura. The weather had been miserable, which didn't help; general employment was down; there'd been the usual complaints about the subsistence level foods; gripes about the Tri-D programming; nothing out of the ordinary . . . yet. There might indeed be the makings of a major blow-up.

It would take two weeks for an improvement in the food to have a perceptible effect: Tri-D programming was undoubtedly being altered but even the most perceptive Talents could be fooled over what the public really wanted on the boob tubes. The variety of "circuses" available was almost as infinite as food-tastes and yet one never knew precisely what would satiate the public appetite. Op Owen made a mental note to check all pre-cog rumblings. Strange there hadn't been any definite incident pre-cogged by anyone when such a large population unit was involved.

"Look, op Owen," Gillings was saying, "I've got to have the team available for riot spotting. Particularly right now. And I can't have them identifiable."

"Then we send Amalda to the hearing made-up."

Gillings muttered under his breath about fancy dress and sow's ears and then suddenly swung round to fix op Owen with a startled glare. Daffyd hadn't expected to keep Gillings in the dark long.

"O.K., op Owen, what's behind all this pussy-footing? Who was trying to snatch Amalda at the Morcam luncheon? Was it the same guy who was at The Fact? Because if it was, let's get him and cool him. I need that team operating. And there's that open charge of riot provocation . . ."

Op Owen took a deep breath. "I don't think it would be advisable to cool Roznine."

"Roznine?" Gillings exploded from his chair with all the frustrated, astonished, exasperated impotence of the strong man suddenly discovering himself in an untenable position. "Roznine! Christ, op Owen, do you know what would happen to this city, in the present mood, if I arrested the Pan-Slavic leader?" He fumed on, in much the same vein, for moments more until either Daffyd's placatory thoughts

or his own lack of breath brought a stop to the flow of recriminations.

"I haven't suggested you arrest Roznine. In fact, that would not only be impolitic but dangerous."

Gillings glared at him, snapping out one short explosive word. "How?"

"Because Roznine is a latent Talent. That's what scared Amalda."

Gillings erupted again, thoroughly enraged. This time the shield of his public mind slipped sufficiently for Daffyd to see past the anger to the panic his confession evoked.

"No!" Daffyd's forcible negative, mental as well as audible, carried weight on every level and blocked those avenues of action which he could perceive Gillings already plotting. "Roznine is contained . . . at the moment. But—this time we don't force a latent into a position where he can become dangerous to an entire city. I want to avoid another 'Maggie O' far, far more than you do!"

Gillings had no escape from Daffyd's mind, so op Owen did not relent in the pressure until he was certain of Gillings' uneasy and resentful cooperation.

"Roznine is no threat to us . . . yet. But he does threaten Amalda," Daffyd went on. "That threat is real. It would be stupid," and he paused to let that word be absorbed, for Gillings was not a stupid man, "to get Roznine so frustrated that additional facets of his Talent—whatever it is—are stimulated."

Gillings' face was a study of frustration. He gave vent to a stream of profanity which so delighted and enlightened op Owen that he could ignore the fact that he was the victim of the spiel. But, with the avalanche, Gillings recovered his mental equilibrium.

"I told you a couple of months ago that what you guys really need is a law that makes it illegal to conceal Talent."

Daffyd laughed wryly. "Roznine may be unaware that what he uses is Talent!"

"Unaware? My effing foot. With all the publicity you guys have been larding the Tri-D's with, he's got to know what he is—especially if he's been playing mental pat-a-cakes with that Amalda. Op Owen, I don't need a Roznine in this city! You Talents put him where he belongs and bridle him or lobotomize him or something. Or I'll invoke whatever law on the books suits me and cool him permanently. I can't have this city turned into a battlefield. Or have you forgotten Belfast?"

His buzzer winked the urgent red. Gillings raised one fist as if to squash the unit and then, swearing viciously, slapped the toggle open.

"Well?"

There was a moment's hesitation. Daffyd could almost see the caller swallowing hastily, probably wishing he didn't have to continue.

"Commissioner, the lawyers for the Waiters' Union are here with bail for their members. Do we release them?"

"I want to scan them," Daffyd said in a swift undertone.

"Delay 'em. Someone's on the way down from this office. Then permit bail."

Gillings tossed an oddly designed coat button to op Owen.

"This'll get you anywhere in the building. And keep it."

Daffyd thanked the commissioner, and left. Prowling the LEO offices would not be a frequent pastime: the 'neural' noise level was more than a telepath of Daffyd's sensitivity could bear.

The Waiters' Union had sent a battery of lawyers to procure the release of their incarcerated members. They had been shown into a waiting room, just off the main admissions hall of the retention section of the LEO Complex.

Daffyd sauntered by, scanning each man's mind quickly. What he "heard" he didn't like, but it confirmed the fact that Roznine was organizing the proceedings. None of these men knew more than his own assignment. But each was moved by an intense desire to complete it expeditiously and successfully or . . . the "or else" held dark, dire and fearful consequences.

Daffyd returned as quickly as possible to the shielded calm of Gillings' private eyrie. The commissioner was absent. Daffyd used the few moments' respite for some solid thinking.

There were times, he finally concluded, when a man had to operate on the "feel" of things alone. He was not, God forfend, a pre-cog, but there were also times when a man simply had to dispense with rational thought and its consequences. Particularly when faced by a free agent like Roznine who could not be expected to have predictable responses to stimuli and pressures.

The similarities between Roznine and Maggie O were inescapable but this time, Daffyd had a tool and a resolve.

"We've been fighting fire with old-fashioned water, Frank," he said to the commissioner when the man stalked back into his office. "From now on we use modern methods, foam and tranquilizers."

"What are you jibbering about?"

"I can't explain, but will you trust me?"

Gillings glared back at him, but his tight natural shield leaked conflicting emotions of desire-to-believe, distrust, and irritable frustration.

"I God-damn well have to, don't I? But, God-damn it, Dave, if you Talents don't contain Roznine . . ."

"*We* can," and Daffyd op Owen began to grin with utter malice for the underhand, immoral, unethical use of Talent he was about to invoke. Lester wouldn't approve ei-

ther, but then, he didn't plan to tell Lester Welch.

The stratagem did require the invocation of the Immunity Act. What Daffyd didn't count on was the hue and cry when the news of the hearing was announced on the media. Suddenly Aaron Greenfield vociferously supported the Waiters' Union in their outraged cry against the Talented abusing untalented people and hiding behind the law. The Morcam Convention Committee tried to evade any responsibility by claiming that they had not hired a Talent team for their luncheon . . . their defense being that *their* convention members were law-abiding peaceful people with no record of violence so a LEO team was unnecessary and an insult to their good name, et cetera. Greenfield made political hay of this as well: he'd never been in support of the Immunity Law because "obviously it was a screen for illegal, immoral, unethical invasion of privacy: one more instance of establishmentarianism and totally unwarranted minority privilege."

"Repeal the Immunity Act; no extraordinary privilege for minorities!"

"Make them pay their own way!"

"Taxation for all on an equal basis."

Pre-cogs began to have troubled incidents. To alter circumstances, the team began wearing disguises, with Amalda and Bruce Vaden both paired to combat-trained LEO men. They were also on twenty-four-hour call, hopping from one gathering to another, trying to forestall explosions—usually at rallies designed to bring their own downfall. Twice Amalda felt Roznine's mind searching for hers. She'd break off all broadcasting and the team would leave that area instantly.

The weather remained unseasonably hot and humid. There were unprecedented foul-ups in the food supply, and a heavy drain on the power sources necessitated cuts of the entertainment circuits. More trouble.

Roznine's stratagem also suffered from his zealousness. On the day of the hearing, there were so many people wanting to attend this test of the Immunity Act that he couldn't possibly have attempted a kidnapping. The press of hopeful attendees provided the LEO officials with an excuse to be selective and, naturally, the audience was conveniently packed with out-of-town Talents whom Daffyd had invited. Sensitives at the Court Block entrance tipped the LEO men off about whom to exclude and the Pan-Slavic contingent was decimated. In the wake of the prosecuting force, Roznine was admitted in his capacity as Pan-Slavic leader since one of the waiters was his ethnic. It was the first opportunity Daffyd op Owen had had to get a

good look at the man and he was somewhat surprised by Roznine's physical appearance. Daffyd would have liked to "scan" him but the emotional aura of the courtroom made that mentally and physically impossible. The telepath pondered on the subconscious impressions he'd been receiving from Gillings and Amalda, for Roznine was a perfectly presentable, personable-looking chap, quietly dressed in a moderately expensive tunic, his heavy head of black hair cut to his shoulders and his thick black moustache trimmed to join the sideburns, leaving the rest of the strong face bare. Roznine took a seat by the wall and turned for a careful survey of those already seated.

Op Owen sincerely regretted the impossibility of probing the man's mind. He must have planned something. He had a "waiting" about him, calmly composed in the midst of a hectic scene.

But there had been no pre-cogs on the situation. There'd been incidental auguries but too varied to be useful or indicative of the trend of the day's events. Daffyd could only conclude, as the correlation staff had, that it didn't matter how the hearing went today. That in itself was unsettling. However, plans had been made for such contingencies as common sense indicated. Daffyd had warned Vaden, among other things, and then "conditioned" Amalda with strong confidences. There were Talents unknown to the girl in the audience and they had their instructions.

Bruce Vaden entered, slipping into an aisle seat at the rear. He, too, glanced around, his eyes sliding past Daffyd's. *He's looking for Roznine,* Daffyd thought, as Vaden's eyes lingered once on some bull-chested man but not on Roznine's mustachioed face. Roznine's attention was held by a wiry little man in sloppy tweeds of ancient manufacture who pranced conspicuously down the aisle to a seat reserved for him by the prosecution's table.

So, thought Daffyd, Aaron Greenfield had a small man's push! Greenfield leaned over, tapping one of the prosecuting attorneys on the shoulder, and engaged him in a guarded conversation, all the time glancing around the audience, pointing at last to the very empty seats on the defendant's side.

The hearing lights went on and the "judge" sounded its electronic gavel for the court to come to order. One of the prosecution team rose to protest the absence of the defendant and counsel, but that was Amalda's cue and she, and her escort, made their entrance.

There was, of course, the anticipated cry of protest from the prosecuting attorneys. The defendant arrived garbed in voluminous robes, bewigged and made up *à la japonaise,* escorted by two women exactly the same to the last hair and

measurement. Even as the prosecution leaped to its collective feet, the three figures shifted in a complicated pattern, making it impossible for any un-Talented person to know which one was which.

However, as this was a preliminary hearing, necessarily conducted in front of the legal computer, the "hearing judge" had no directives about the dress or escort of the defendants and/or attorneys so long as they appeared clad and reasonably clean. Prosecution replied that the defendant was deliberately obstructing justice by appearing with look-alike escorts. One of the Amaldas rose, presented two sets of credentials as legal counselors for the defendant and asked the "hearing judge" if it was programmed to refuse defendant's counsel on the basis of similarity in shape and appearance to defendant. The objection was overruled.

Prosecution instantly demanded EEG readings to prove that the women so attired were in fact the aforesaid attorneys and the defendant.

Defense had no objection and EEG readings were promptly taken, establishing beyond controversy who were the attorneys and who the defendant. At which point, the three women repeated their rapid "shell-act." Daffyd op Owen watched furious anger suffuse the faces at the prosecution table, evidence that the ruse was successful. The audience murmured, half in amusement, the other half totally confused by the antics.

The hearing proceeded with the charge being made of illegal arrest and restraint, countered by the defense invoking the Professional Immunity Act, requiring that the complaint against Amalda, Registered Talent, be dropped.

Rather smug, Daffyd missed the first twinge of Amalda's alarm.

"Daffyd," she said more strongly, her tone anxious, "he's after me."

"Make everyone laugh," Daffyd said and so quickly did she react, with such forcefulness, that Daffyd didn't need to call in the reserve empaths to help.

For a moment Daffyd wondered if fear prompted her outrageous strength for everyone in the audience, including himself and the planted Talents, was struck by an epidemic of giggles. It would appear that the audience was attempting to laugh the complaint out of court.

Daffyd suppressed Amalda's projection sufficiently so that he wasn't doubled with uncontrollable mirth. Roznine had a rictus-like grin across his face: he'd leaned back against the wall in an effort to control his body and he was forcing his head to move so he could scan the audience. Daffyd bent over slightly, counterfeiting excessive mirth, and noticed that Red Vaden and the other Talents were doing the same thing.

Grand! Let Roznine think only Amalda was responsible! But could Amalda—even with Red helping—broadcast so strongly? Could she actually use Roznine without his consent? If so . . .

The hearing judge mechanically sounded the gavel and called for order, its voice getting louder and louder as the giggles continued. It ordered the courtroom cleared of "obstructionists." The paroxysms which had afflicted everyone abruptly ceased and people weakly wiped their eyes and ordered their clothing. Aaron Greenfield looked anxiously around, his face flushed with anger. The man was no fool, Daffyd realized. He'd know that Talent had been responsible and, with his prickly dignity offended, he'd redouble his efforts to get the Talented taxed. *Oh, well, you can't make an omelette without breaking eggs,* thought Daffyd philosophically. He nodded approvingly at Amalda who, with her twins, had sneaked a glance at him.

Prosecution then announced possession of a sworn statement from the Morcam Convention Committee that it had requested no LEO surveillance. Defense replied that all convention situations fell under the Riot-Prevention Act and the LEO Commission was quite within its jurisdiction to use such riot prevention techniques as seemed advisable. The uncertain climate of the city was cited to be in the "unsettled" percentile, which permitted the LEO Commission to take such precautions as it deemed necessary to ensure law enforcement and order. The defense counsel reminded the "judge" that any gathering of two hundred or more persons (and the Morcam luncheon had had five hundred and twenty-five paid and consumed covers) was liable to auxiliary surveillance whether requested or not when the climate of the city registered in the "uneasy" percentiles. Prosecution demanded to know exactly what riot prevention technique was employed by Amalda. Defense responded that she was a registered empath of a +15 sensitivity and a perceptive rating of +12, and offered to produce positive testimonials from organizations which had employed Amalda in her capacity as a Talent for riot prevention. Prosecution repeated its demand for an explicit description of her crowd control technique and defense invoked the provisions of the Law Enforcement and Order Commission.

Daffyd wasn't certain whether the prosecution wanted to separate Amalda from her look-alikes or discover the exact procedure she used.

Defense again requested that the charge be dropped: she didn't wish to waste the Court's time and public money when the evidence clearly pointed to a *nol. pros.* situation.

Prosecution insisted vehemently

that this was a clear case of personal infringement and misuse of privilege just as the time limit light came on. There was the rumble as the "hearing judge" searched its programming for precedents. That didn't take long. Moments later the date for a trial appeared on the screen: a date seven weeks hence.

Not bad, thought Daffyd, although he'd half wished that the computer would throw the case out. With no precedents, there'd been slim chance of that.

Amalda's fear was like a knife in his own guts. He tried to get through to Roznine, to fathom what the man was doing. Bruce Vaden jumped to his feet, started down the aisle, his progress blocked by others who were beginning to leave the courtroom.

Daffyd had the sense that every Talent in the audience stiffened suddenly and then Roznine, half rising from his seat, stunned amazement on his face, began to topple slowly over onto the people in the row in front of him.

"Hey, this guy's passed out," someone cried. "Is there a medic around?"

Bruce Vaden kept trying to reach Roznine. Daffyd signaled to two other Talents to assist. If they could bring Roznine to the Center this way . . .

"I'm a physician," a woman said in a firm loud voice, three rows away, holding up her emergency pouch. There was a slight scuffle as Bruce tried to intercept her, but suddenly the Pan-Slavs moved, jumping over seats, knocking people aside in an effort to protect their fallen leader.

Daffyd caught Vaden back, called off the others.

The bailiff scurried from the courtroom, yelling for an ambicopter as the woman medic and three Slavs lifted the stricken man and carried him to the prosecution's table. The "hearing judge" began to call for order, for the next case, for the obstructionists to be removed from the courtroom. Its voice got louder and louder until it finally called a recess until the court could be humanly cleared.

"All right, all right, we've got him under heavy sedation in the Court Block infirmary," Frank Gillings told Daffyd, "but that took doing. The place is crawling with Pan-Slavs. We can't arrest a man for collapsing in court . . . and how did you do it?"

"One of the teleports gave him a 'punch'," Daffyd said with a rueful grimace.

Gillings stared at him with awe and respect.

"One has to be very careful," Daffyd explained almost apologetically, "pressing against the carotid. But he was pressuring Amalda."

"You expected that! But I expected you guys to grab him there. And that God-damned hearing is

affecting the entire city. Now don't tell me you expected that!"

Daffyd looked at Gillings and, for a microsecond, hesitated.

"No, not exactly, but we're doing our very best."

"What? What in hell do you mean by that?"

"I mean, we've set the trap and the bait and we simply have to have patience."

"Patience? With this city about to erupt?"

"Curiously enough, Gillings, I don't think the city is going to erupt. Oh, we've recorded some incidents, minor ones, involving Talents . . ." and Daffyd frowned because the incidents were distressing and so vague that only a general all-Talent warning could be issued.

Gillings gave one of his disgusted growls. "You guys make me sick. You can't even protect yourselves."

"We'll do what we can," and Daffyd's voice turned steely enough to reprimand Gillings. "What concerns you, Commissioner, is the fact that our pre-cogs have predicted no major incidents. Your city is going to be safe!"

"Prove it!" demanded Gillings but Daffyd op Owen made no reply as he left the commissioner's office.

It took the telepath the entire trip back to the Center to get control of his inner perturbation. Of course, Gillings had to be ruthless and consider only the larger aspect, the safety of the city, but it galled Daffyd to think that Gillings could so offhandedly dismiss the personal trials of the Talented. It grieved Daffyd that there would be more precedents on the newly-programmed Immunity Law after the next few days. The fact that Talents would now have redress for the pre-cogged personal assaults on them was no satisfaction. He'd really have preferred never to have to invoke that law.

It would serve Gillings proper notice if Roznine did burst out of bounds . . . And how in hell were they to promulgate a law that made it illegal to conceal Talent? Latent Talents were always cropping up when the right connections were made . . .

And not a single incident connected with Amalda or Red or Vsevolod Roznine. And he'd had every pre-cog in the Center sensitized to that unholy trio. How could that possibly be?

Daffyd's state of mind was grim as he landed the copter on the roof of the main administration building of the Center. He tried to drain the poisons of bitterness and anger from his mind as he descended the stairs. He paused at his office door but swung away. He had to calm himself. This excessive reaction was self-defeating. Gillings might be latent Talent himself but he remained obdurately impervious to the problems of the Talented, especially when they interfered with the

law enforcement and order of his precious city.

While Roznine was unconscious in the Court Block infirmary, Daffyd had managed to implant a suggestion that Roznine seek Amalda out at the Center. It was the only feasible practicable method . . . make the mountain come to Mahomet. And the mountain must apparently come of its own volition. Now, if he could just get Mahomet to do a Lorelei . . . it would speed matters up, and maybe so many Talents wouldn't get hurt.

That brought Daffyd back to the point of anger he'd reached in Gillings' office and the whole thought sequence started again.

His path led him past the playyard where he could hear the children yelling and screaming, arguing over some violently important triviality. Triviality? To him, perhaps, yet they were as devoted to their separate sides of the argument as he was to . . .

"Well?" Sally Iselin stood in his way, her fists planted on her hips, the expression on her pert pretty face mockly ferocious. "Aren't you pleased with the outcome of the hearing?" She frowned, sensing his uncertainty. "But you were able to plant a suggestion in Roznine's mind? Oh, that Gillings. What is it about a cop that sours the man?"

It was Daffyd's turn to be surprised. "That's pretty good reading, Sally."

As suddenly he felt her mind tighten and the contact that had begun to lift his depression was taken away.

"What does Gillings expect of us anyway?" she asked petulantly.

"A happy ending!"

Sally eyed him speculatively and then fell in step with him, grinning impishly.

"There has to be a happy ending to every fairy tale, after all. Though I shouldn't have expected it of Gillings, fer gawd's sake."

Her switch of mood, while it obscured her thoughts from him, lifted his spirits. Nonetheless, he said rather gloomily that there hadn't been a pre-cog of any happy ending for Cinderella.

"Oh, you . . . honestly!" Sally sounded peeved and her eyes flashed at him irritably. "Your trouble, Daffyd op Owen, is that you don't really believe in Talent."

"I beg your pardon?" Daffyd stopped and stared down at her.

"Just because no one has precogged a disaster of some monumental proportion resulting from this fairy tale affair, you're down in the doldrums. Does everything Talented *have* to end in disaster? Are you going to be committed to grief for the rest of your born days? Or are you willing to admit that there hasn't been a disaster pre-cog because there isn't going to be a disaster? That things will work out right? All the sensitives are edgy, but *not* miserably so. Good God, do we have to wallow in sorrow all

the time? Do we have to run around wondering if we have a right to be happy?"

Daffyd had thought he knew Sally Iselin fairly well but this—from a girl characteristically full of puppyish good nature and exuberance?

She turned on him, her brown eyes flashing with anger as she stamped her foot. "And I am not a good-natured puppy! I can be just as much of a bitch as any other woman!"

In that outraged mood, she forgot to shield her inner thoughts. It was all there, what propriety had kept Daffyd from "perceiving" and her sense of honor had prevented her from showing him more openly.

Abruptly Daffyd reached out and drew her into his arms, savoring the miraculous disclosure. Unaccountably Sally struggled, and courtesy disregarded, Daffyd probed deeply into her mind, past the barriers she had carefully erected, past the pert verbosity with which she masked those inner feelings. With a strangled sob, she relaxed against him and let him perceive the whole of her conflict. The older man/much younger woman, her yearning to be tall/elegant, an appropriate spouse for a man of his status/abilities, the puppy image of herself from his mind, her feeling of inadequacy because she couldn't locate more and more Talents to relieve the burdens on him . . . all the small sins and great vanities that inhabit the soul of any human being. And what he saw in that instant of perception only endeared her to him more.

With one hand he tilted her head back, forcing her to meet his eyes, amused that a telepath required a look. Her mouth lifted slightly in a smile as she shared his thought. He felt a pressing need to articulate the thoughts he was transferring to her mind but all he could say was her name before he kissed her. No more was needed.

The next morning the nebulous anxieties of the sensitives were translated into attacks on the Talented. One of the finders attached to the LEO Block was beaten up on his way to the Center. A Talented mechanic at the big Mid-Town Parking Complex was seriously mauled and shoved into the boot of the car he'd been servicing. Two healers at General Hospital were raped and shorn of their hair, but their assailants were caught because the girls had the ability to "call" for help.

In the clear light of that morning, Daffyd bitterly wondered if indeed he had a right to any personal happiness.

"And if that isn't a piece of outright antediluvian puritanical nonsense, I don't know what is," Sally said, popping out of the bathroom with all the savagery of a miniature. "And I am not a miniature anything, Dai op Owen."

But she was comical enough in her undressed state, mentally bristling at his thoughts and aggravated by his pessimistic rumination to set the morning's disasters in their proper perspective.

"I'm not sure what good it'll do to have Roznine marching in here now," she went on, pouring out coffee for them both.

"I'd hoped he'd come as soon as he regained consciousness."

Sally's eyebrows flicked up. "You've never failed of your mark before. Unless . . ." She pursed her lips, frowning.

"Amalda's inhibiting him?" Daffyd caught the half-suppressed notion.

"You know she's scared of him. I mean, scared as a woman is of a very domineering man . . . sexually, I mean. Oh, you *know* what I mean and then there's Bruce Vaden . . ."

"Amalda had proof positive yesterday that Roznine couldn't dominate her."

"Perhaps . . . I mean, intellectually, Talent-wise, yes. But it's Bruce that's holding her back. He's already at the top of the glass mountain and Amalda doesn't dare roll the other apple."

Daffyd caught the unarticulated ramifications of Sally's thinking. Part of Amalda's reluctance to admit Roznine's attractiveness to her stemmed from a fear of losing Bruce Vaden to whom she was equally attracted but for different reasons.

"She's not one to drop the bone she's got in her mouth for the one she sees in the water," Sally said.

"Now it's fables?"

"Why not? You added myths to my fairy tales so it's my shot."

"That only leaves me proverbs."

"So?"

"So! That leaves us with Amalda inhibiting Roznine?"

"He should've been here otherwise."

Daffyd was turning over this interesting possibility in his mind when the comset beeped.

"Boss, we got pickets out in front," said Lester in a thoroughly disgusted tone of voice. "Pay your share. Everyone else is taxed. Why not you? No minority privileges."

Daffyd sighed long and deeply.

"Pete's on reception and he says they've got legal political platforms, their ID's are upstate and they're registered party members. Legally, under the Political Platform Act, they can picket the grounds because there *is* legislation concerning our tax status before the state senate right now."

"Did you inform Gillings?"

"Hah! They informed us about the time the first picketers foregathered on our gatestep. What'n hell happened to your Machiavellian nonsense of yesterday?"

" 'There's many a slip twixt cup and lip!' " Daffyd replied. Sally gasped and signaled surrender.

"Huh?" Lester wanted an explanation.

"I must ask Gillings if Roznine's had a visit from Aaron Greenfield since the hearing yesterday," was Daffyd's reply.

"Did you goof, boss? Now what do we do?"

"Keep tabs that the on-lookers remain quiescent and alert riot control."

"Amalda and Red?"

"No, plunk Harold in the gate-lodge with Pete. Ask Gillings . . ."

"Ask him yourself: Charlie says he's just called through."

Before Daffyd could request a deferment of that call, Charlie had patched it through and Daffyd hoped his flinching wasn't apparent to the LEO commissioner.

"You got troubles?" Gillings' face was impassive.

"Nothing we can't handle . . ."

"Oh, the trap's sprung?" Gillings looked almost pleased.

"Hm-m-m . . . but I'd like a few of your riotmobiles around."

Gillings' expression changed rapidly to sour discontent.

"Like that, huh? I thought Roznine was supposed to come like a lamb."

Daffyd shot a glance at Sally who was muttering something about metaphors being illegal. Her levity was not appropriate to the gravity of the present situation and yet . . . it helped.

"Roznine's a strong personality."

"I'm going after him . . ." Gillings now looked like a trap sprung.

"Gillings," and Daffyd's tone of voice was far sterner than people were apt to use in addressing the LEO commissioner, "don't go after Roznine. We've exerted all the pressure possible under the circumstances. He'll come . . ."

The commissioner regarded the director for a long moment.

"You better know what the hell you're doing, op Owen."

"I do."

"Well, you sound as if you do," Sally said when the call was disconnected.

"I really think I do, Sally." Daffyd looked out of his window toward the building which housed Amalda and Red. "Two birds in one bush, two baskets with the same eggs, two minds with the same great thought . . ."

"Spare me! Uncle! I yield!"

"Good, then let's figure out how to unwind Amalda. I did not suggest to Roznine that he bring Great Birnam wood to Dunsinane."

"I should have guessed that Shakespeare would be next."

"Considering my propensity for quoting Alexander Pope, I wonder you dared."

"He's coming for me," said Amalda when she and Red noticed the circling picketers and the gathering of curious bystanders.

Bruce Vaden threw back his head and roared. He wasn't counterfeiting the amusement though it had a bitter note. But her woebe-

gone expression was ludicrous and his laughter was not the sympathy she'd expected.

"My dear child, if Roznine has to salve his Slavic ego by resorting to that kind of subterfuge . . ."

"What on earth do you mean?"

"I mean that Roznine simply can't walk in here, no matter what suggestion op Owen planted in his mind when he was unconscious."

Her irritation was replaced by a shudder. Vaden could feel the repugnance she experienced when touching Roznine's mind. But her impression no longer dominated his reaction to Roznine. Not after seeing the man in court yesterday.

"Did you really look at Vsevolod Roznine yesterday?"

Amalda gave him that wide-eyed innocent stare and he felt her going "dead" on him. At first Bruce'd thought it was because she was afraid of Roznine and censored any references to him. Now he knew differently.

"Mally hon," and he took her by the shoulders, forcing her to look him in the eye. "I *looked at* Roznine. I looked him over good and strangely enough, I liked what I saw." That got her where she lived, Red saw, and took a deep breath, opening his own inner mind so she couldn't fail to see the sincerity of his words. "He's the kind of guy I'd trust and respect even if I could probably take him apart in a fair fight. Oh, I know. I've heard all this static about his sewer-sink mind and his power in the city and I don't know as my public mind would be all that clean and pure. I've learned to do my improper thinking carefully but no one's warned Roznine that there're guys around reading him now and again."

Amalda was staring up at him. Her eyes had gone all big and her lips were parted. He wanted to kiss her, to love and reassure her, but not just then.

"Mind you, I don't think Roznine's a crusading saint but feckitall, Mally, he's up against City Hall and when you're fighting City Hall you use every advantage you can beg, borrow, or," he clipped her lightly on the jaw, "kidnap. Not that I blame him for flipping his nut over you." He couldn't keep his voice steady and he knew he was playing-back their initial meeting. "If you affect Roznine the way you do me, I'm damned sorry for the poor guy. It must be hell for him to want you and not get you."

Amalda discarded all restraint and now remorse/love/appreciation/agreement/understanding/pride/loyalty washed over him.

"Don't do that, Mally. I've got to think."

She bit her lip apologetically and "buttoned" her emotions up.

"Thanks. Now, where was I? Yeah. As of yesterday, I don't think Roznine could use you. Not now. Or only if you let him. And

you won't. If that's what's bugging you, forget it. Or don't you remember how easily you knocked him out? You gotta take it easy on the guy, hon. He loves you even if he doesn't know it."

"It's you I'm worried about, Bruce," she said in a very low voice, her eyes wide and full of tears.

So he embraced her, pressing her slender body against him, so she'd "feel" all he couldn't express. His knowledge that you aren't selfish with Talent, whatever kind you possessed; that they'd had a relationship too strong to be broken or diminished by the acceptance of a third party; that Talent had obligations beyond the personal and this was one of them, for both Amalda and Bruce.

She reached up tenderly to stroke his face, her fingers enjoying the tactile contact with the silky hair of his beard, letting her fingers express what she didn't articulate. As she had learned to accept Bruce's right to decide for them both, she accepted his decision now.

"The stage is set, honey," he said finally. "Extras all milling about, waiting for the director. Are you going to let him come?"

She gave an impatient little shrug, then squared her shoulders and smiled at him, ready to move mountains from the look of her. He liked that about Amalda, among a thousand other things. He conveyed that approval with a gentle-mind-blown hug. Talent has advantages, too.

Roznine rubbed at his temples, wondering what kind of fake powder the medic had sold him as a headache remedy.

They had done something to him when he was unconscious. Just as he, Vsevolod Roznine, knew that *they* had caused him to black out at the hearing. No, not "they"! *Her!*

The conviction that he had to get to her, be with her, returned with renewed and irresistible force. And Roznine fought it again, fought it as his head throbbed, and his hands clenched into fists of effort to withstand the compulsion.

He flung himself from the table, catching the leg with his foot and upsetting the untouched meal, half-stumbling against the door and striking his temple on the frame. He hit his head a second, a third time. And clutching the molding, threw back his head in bitter laughter.

"Roznine has to beat his own head, because it feels so good when he stops!"

His fingers dug into the frame until his nails bent against the durable plastic. His head turned slowly, as if he could see straight through concrete and plastic, across the miles to the Center in which direction he unerringly turned.

"No!" This time his fists thudded

into plastic. "Roznine does not come at a woman's call. She comes to him!"

How had they done this to him? How could she call him? Once he'd known her name and that she was at the Center, he'd had his people find out all they could. She was registered as a telempath. Roznine had looked that up and the answer had only confirmed what he'd guessed himself: she could transmit emotions and probably receive them.

Roznine pounded the wall viciously, transmitting such hatred and discontent as boiled up in him from the frustration of not having her and the humiliation of being knocked unconscious . . . in full view of his constituents . . . by a slip of a girl he could break into two pieces with one hand.

And who was the red-bearded man who worked with her? How close did he work with her?

Jealousy was added to the seething emotions of Vsevolod Roznine. And the skin of his skull pulsed with a surfeit of his angry blood.

The intensity of his desire to see Amalda reached another peak. He fought it. He would not go to her. She must come to him! He could not go to her. She had to come to him. She, who could read his thoughts, let her read that one. Let her read his feelings . . .

"No!"

Roznine stopped. Everything about him stopped, his heart, his lungs, the oxygen molecules in his blood. Then he took a deep breath and exhaled, his wide mouth forming an odd smile in a suddenly calm face.

No wonder she had not come to him, the little one. She *could* read his thoughts. She would be terrified of him, Roznine: terrified of the anger he had felt toward his little bird. He had felt her fear before, felt her spirit fluttering away from him. That was why she had run from The Fact. But she shouldn't fear him, Vsevolod Roznine. He would go to her. He would explain.

Chort vozmi! Would his head never stop aching?

His comset buzzed. The noise stabbed piercingly through his skull. He grabbed frantically for the set to stop the noise, answering in a savage tone.

"Everyone's in position, *Gospodeen*."

"Position?" Roznine shook his battered head, unable to recollect which position and where.

"The picketers have been checked by the Center's guards, who are two old men: nothing to worry about."

Picketers? Pickets? At the Center? Oh, yes. He'd discussed that with the little man from upstate. How could he have forgotten?

"And the riot squad?"

"Parked at or working conveniently nearby. The disposal men are—"

"Good enough!" His head

pounded like a drill press but he remembered. How could he have forgotten? So she was part of a riot control team, was she? Well, let her control this riot! Men would pour in to the Center's so private, so secluded, so sacrosanct grounds from all over the city: men from all ethnic groups so it couldn't be blamed on his section. It had meant canceling half the favors he was owed but just let him get his hands on that little riot controller and . . .

He threw open the window, illegally unsealed, and slid down the airshaft on the escape line. He opened the window in the rear flat, which conveniently belonged to a relative who was blind anyhow, and exited through the back door. He found the iron pry-bar and flipped up the sewer lid, snagging it deftly back over the manhole when he was within. He walked briskly over the thin stream which trickled down the pipes at this time of day. Two rights and a left brought him to a wider section conduit with a catwalk on one side. Two more rights and two lefts and he climbed a ladder. The manhole had been shielded and a disposal truck was just drawing up. Swiftly he was within the truck and issuing orders.

The sensitive signaled LEO headquarters that Roznine had left his quarters. Immediately Gillings warned the Center and circulated the alert to all stations.

Charlie Moorfield rang through to Daffyd's quarters.

"Ring Amalda and tell her I'm on my way over."

Sally was struggling into her coverall, excitement making her fingers fumble so that Daffyd held the collar until she could find the armholes.

"He is coming. You were too much for him."

"Possibly."

Daffyd could also see another interpretation of Roznine's secret exit, particularly with the picketers outside and the observers forming a larger and larger ragged semicircle beyond the gates to the Center.

"Yes, I see what you mean, Dai."

"Let's reinforce Amalda."

The buzzer sounded again. "Boss, I get no answer from Amalda."

"Tell Gillings to get all riot units here on the double. Alert ours."

Daffyd op Owen swore as he grabbed Sally's hand and pulled her out the door. Short of teleporting, he'd never been down the stairs so fast. Afterwards Sally told him her feet had touched the steps only three times.

Amalda and Bruce Vaden had exited through one of the side-gates in the grounds. They'd come up on the picketline from one side, mingling with the onlookers until they were directly opposite the main gates. The picketers were dutifully chanting the slogans they carried,

the four LEO men routinely assigned to a picket were almost as bored with the proceedings. A passenger conveyance settled to the public landing some hundred yards from the gates and the occupants, carrying collapsed signs, descended in an orderly fashion.

"Those are bully boys, not bona fide picketers," Bruce told Amalda in a quiet voice.

She nodded, for she'd unerringly sighted the one man important. *"He's* with them."

"Well, this is the last place he'd be looking for us. Are you shielding tightly?"

Amalda nodded again but she didn't take her eyes from Roznine.

He really was attractive, she thought. There was something proud and fierce in his manner. Bruce was right: she hadn't really seen him before. She'd been just so scared of his mind . . .

She stopped thinking because Roznine was suddenly glancing over his shoulder, at the crowd, frowning slightly. He stood near the copter, to one side of the new shift of pickets. They were milling about . . .

"Warn Dave, Amalda, and get set. See how they're maneuvering?" Even as he spoke, Bruce glided to a more advantageous position for teamwork.

The new arrivals, for all their aimless movement, could now be seen aiming for the LEO men and the Center's two guards, mild-appearing gentlemen who were in fact top kineticists and could hold a grown man immobile on the ground without lifting a physical finger.

The old shift broke from their circuit, grounding and collapsing their signs, preparatory to leaving. Some elements of the crowd which had watched pacifically from the footpath began to move toward the grounds.

Amalda began to broadcast, gently at first, the feeling of immense fatigue, utter boredom and a dislike of this activity.

Bruce moved further across the street, picking up and increasing the intensity of her broadcast. But he watched Roznine, saw the man stiffen, his head turn slowly, unerringly toward Amalda. The group in which she had been standing shifted and she was by herself.

The setting of the confrontation was superb, Bruce Vaden told himself with a curious objectivity. As if by magic or common consent, everyone melted from the two principals, leaving a clear path between them.

"Don't get scared, honey baby," Bruce told her under his breath, fighting in his mind to hold the broadcast and disguise the inner reluctance of sharing Amalda with anyone at all.

Suddenly he felt buoyed up, felt the indescribable mental support and touch of Daffyd op Owen,

speaking through him to Amalda. And it wasn't just Dave, but something . . . no, *someone* else.

The area was blanketed with silence by Amalda's projection, which began to waver slightly. Bruce intensified it, imagining as he'd been taught, that the emotion was something visible which he was manipulating tangibly, as visible and tangible as water falling over a specific area, drenching everything with its cascade.

Everything went at half speed. Roznine pulled first one heavy leg forward, then the other, like a man treading through molasses, sticky, cloying. The man's face was contorted with effort and concentration.

Amalda just stood, her chin slightly raised, looking as regal and poised as she had on The Fact's stage, so sure of herself that she almost fooled Vaden.

The action was all slow motion: the picketers, real and bogus, discarding their all-too-heavy signs, inexorably sinking to the ground, sprawling in poses of utter exhaustion. It affected the LEO men though they tried hard to resist the pressure, falling to their knees and hands, faces down on the ground.

Then only she, Bruce and Roznine were standing. She took a deep breath and looked straight at Roznine's eyes: the first time she had done so.

And Bruce was right that Vascha (she found his nickname easily; though he thought of himself, self-importantly, only as Vsevolod Roznine, the Vascha personality was there, too) was nice looking, with a strong body and sensitive hands. She liked long, well-shaped fingers on a man—she liked to have such hands on her body.

"All right, here I am," she said out loud and dared him in her mind to overpower her.

His eyes seemed to eat her flesh hungrily, as if starved for the essence beneath the covering tissue.

You're mine. I, Vsevolod Roznine, say you are mine. That was his thought, beating away at her. She wanted to laugh, to sing out because his thought couldn't go any farther than her mind. It couldn't reach Bruce, standing not more than five feet away. Not unless she wanted it to go farther!

"Well, what are you waiting for?" she asked gently because the knowledge of such total power over another human being humbled her.

Some of his bully boys were getting to their feet, for she'd turned off some of her blanketing projection to deal with Vascha. Through Vsevolod Roznine she sent a fleeting thought of nausea that instantly reduced them to retching bodies on the grass. And as abruptly, she deflected the actual illness. Then she turned off the empathetical broadcast completely, knowing its cessation would leave the victims disoriented enough to cause no further trouble.

"I think you'd better come with us, Vsevolod," she said to Roznine and took his hand, turning and leading him toward the Center as if he had no other choice. He didn't, because Bruce fell in on the other side, their strides matching.

Roznine was dazed, his lips compressed into a thin line. He glared down at Amalda as she led him, at arm's length, like a mother dragging an errant child home.

The gateman nodded to the trio as they passed into the Center's grounds.

"What'n hell has happened to your common sense, op Owen?" Frank Gillings demanded. "Letting not only Amalda and Vaden but Roznine into the city council? For Chrissake that's what he wanted Amalda for . . ."

"Easy, Frank. The team's on assignment, completely legitimate."

"Council isn't a riot situation."

Daffyd raised his eyebrows in polite surprise. "No? According to Roznine, the tempers get so hot no constructive work is ever done. Each ethnic group insists that its members are being discriminated against with accusations and counter-accusations until the mediator adjourns the hearing with nothing accomplished except exhibitions of parliamentary bad manners. Sorry. The team is going to cool things long enough for common sense to prevail. Roznine's reason for wanting Amalda's Talent in City Hall was valid." Daffyd also neglected to add that that was the bargain he'd struck with Roznine to join the Center. All the man wanted was to be certain the employment allotments were impartially assigned. Well, not all, Daffyd amended to himself, but Roznine had gone about it wrong.

Daffyd grinned reassuringly at Gillings' image in the comset. "He's part of the team now and *she* follows orders."

"But does Roznine?" asked Gillings sarcastically.

"As I've explained to you, Frank, Roznine is parapsychically dead to

the analytical laboratory

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PLACE	TITLE	AUTHOR	POINTS
1	The People of the Wind (Conc.)	*Poul Anderson*	1.73
2	Earthquake	*William E. Cochrane*	2.00
3	Not Polluted Enough	*G. H. Scithers*	3.61
4	Moon Rocks	*Tom Purdom*	3.67
5	Polimander's Man-Thing	*Pat deGraw*	4.00

anyone else. Oh, Bruce Vaden empathizes with him to some extent now that they've both had training, but Roznine's is a one-way Talent, right to Amalda. She's the focus of the gestalt. You might say, he's been check-reined."

Frank Gillings grunted, somewhat mollified. Then, jutting out his chin, he glared at the director. "You going to start lobbying for a rider on that Talent Immunity Law?"

"Immediately. In fact," and Daffyd's smile broadened with sheer malice, "Senator Greenfield is helping us get an interim rider through the State Senate on a Bill he has coming up on the agenda next session."

"Greenfield?"

"Yes. Roznine invited him here to the Center for a chat. The senator was most amenable to the suggestion."

The LEO commissioner's frown was partially perplexity. "What'd you guys do to Greenfield? Blanket him with loving kindness?"

"Good heavens, no. It was merely pointed out to him that the Center is not a minority, but a collection of minorities since all ethnic groups are represented. He took a tour of the grounds and instantly perceived that the housing was by no means as luxurious as he'd been previously led to believe, with swimming pools or wasted space that might house additional families. In fact, he complimented us on our planning and thrifty use of facilities."

Frank Gillings was by no means taken in by Daffyd op Owen's bland manner. He growled something under his breath.

"What did Roznine have on him, Dave?"

"I don't know what you mean, Frank."

The LEO man made a gesture of disgust.

"Dave, don't give me any more problems for a while, will you?"

"Nothing's coming up in the foreseeable future."

The screen went blank on Gillings' incredulous expression.

"Daffyd, that was highly immoral, unethical and downright dirty," said Sally, half scolding as she rose from the couch where she'd been sitting out of line-of-vision of the comset. She walked in under his arm, linking him around the waist. He nuzzled her curls and kissed her forehead.

"Probably. Les is always reminding me that it's bad policy to tell all."

"It's a shame about Vascha though." Sally sighed.

"Why?"

"Oh, it's rather sad, his being a psychic mule, her Pegasus."

"Thank God he is," Daffyd said so fervently she looked up, startled. "With the ambition and drive that young man has, he'd rule the world in half a year if Amalda and Bruce weren't there to stop him." ■

You can't get something for nothing. But scientists and engineers have found many applications for vacuums. So they work hard to produce—nothing!

rarefied atmospheres

GARY E. MYERS

In 1643, Evangelista Torricelli filled a long glass tube with mercury, and then upended it in a dish of the liquid metal. He was probably neither the first to perform this experiment, nor the first to observe that not all the mercury ran out. He *was* the first to realize that the 760-millimeter-high column of mercury remaining in the tube was supported, not by the vacuum above it, but by the pressure of the atmosphere on the mercury in the dish. This perceptive insight earned him a place in science history: the basic unit of pressure measurement in vacuum technology is now known as the *torr;* it is defined as 1/760 of sea level atmospheric pressure, at 0°C.

Until early in this century, the Torricellian vacuum (that produced above a column of mercury) was the most perfect that man could devise. Giant strides have been taken in the last few decades, however, and now we are able to produce and measure pressures of 10^{-13} torr, some 10,000,000,000 times lower than the Torricellian vacuum.

Vacuum systems are not as spectacular as lasers, or as impressive as nuclear reactors, and few people are more than fuzzily aware of the complex and sophisticated equipment that is required to produce volumes of near-nothingness. Indeed, the many and varied uses of rarefied atmospheres are somewhat obscure, even though they play an integral part in present-day technology.

If you own any optical instruments of even moderate quality, their individual lens elements have almost certainly been antireflection coated. Such coatings greatly enhance the contrast and apparent image sharpness of such things as cameras and microscopes, while in zoom lenses having a dozen or more elements, coatings are an absolute necessity: reflections from uncoated lens elements would cause the loss of more than half of the light.

Antireflection coatings are applied to the lens elements by heating a charge of the coating material in a vacuum; the material evaporates, and then condenses on the

cooler lens surfaces to form the coating. The thickness of an anti-reflection coating is on the order of 10^{-5} centimeters (cm), and it must be accurately controlled and extremely uniform. Vacuum evaporation is the only practical method for achieving such precision on a production scale.

This method is used to produce reflective optical elements, also. The mirror in your single-lens reflex camera was aluminized by vacuum evaporation, as was the 200-inch-mirror on Mount Palomar. An evaporated aluminum film has a reflectivity of about 85 percent, which is adequate for most applications. Some gas lasers, however, simply will not function without end-mirrors having 99+ percent reflectivity, and this degree of efficiency can be found only in mirrors formed by vacuum evaporation of successive layers of dielectric material.

The success of the vacuum evaporation process depends to a great degree upon the ability of a molecule of evaporated material to travel, unimpeded, from the hearth of the evaporator to the substrate on which it and others like it will condense to form the film. The fact that the films are usually quite thin and must be of a uniform thickness requires that the hearth and substrate be separated by a fairly large distance.

The average distance a particle of molecular dimensions can travel before striking a gas molecule is known as the *mean free path* (mfp). At 760 torr (atmospheric pressure), the mfp is about 7×10^{-5} cm, which is approximately the wavelength of red light. At 10^{-5} torr, however, this distance is increased to about 500 cm, which is a more than adequate separation for most vacuum evaporation processes. In addition to the mfp considerations, the purity of the condensed film depends upon the degree of the vacuum in which it was formed, since molecules present in the residual gas will become occluded, or mixed with the film. Therefore, reductions in pressure to 10^{-6} torr or less are usually desirable.

It might seem that it would be a simple matter merely to pump the offending gas out of the system; in practice, however, this proves to be anything but trivial. A quick look in a physics or chemistry text will yield Loschmidt's number, the number of gas molecules in one cubic centimeter (cm^3) of our air. Or, if you are so inclined, a simple calculation using Avogadro's number and the volume of an ideal gas will give it to you. Either way, it comes out to 2.7×10^{19} molecules/cm^3.

A large number, yes—but how large? It takes about a second to say "ten-to-the-nineteenth" (forgetting the 2.7), yet it is a number thirty times greater than the total number of seconds that have

elapsed since the beginning of the universe!

Or, to put it on a physical basis, 10^{19} grains of fine sand would fill 50,000,000 large dump trucks; alternatively, a like number of drops of water would fill Lake Erie to overflowing. And while you are thinking about this, keep firmly in mind the fact that one cm^3 is less than one-sixteenth of a cubic inch.

To say that Loschmidt's number is "large" is to indulge in a massive understatement. Yet, this is the concentration of gas molecules with which a vacuum system must deal.

The vacuum pump was invented in 1650 by Otto von Guericke of Magdeburg, Germany. It was a crude, hand-operated device built much like the water pumps of the time, but with it von Guericke was able to astound his contemporaries with showmanlike demonstrations of some of the remarkable powers of a vacuum. The most famous of these exhibitions is the one performed for Emperor Ferdinand III in 1654, involving the Magdeburg Hemispheres. Von Guericke constructed two large, hollow metal hemispheres and joined them with a greased gasket; then he evacuated the resulting sphere and harnessed a team of horses to each half. The horses could not, of course, separate the hemispheres until air was readmitted.

The vacuum produced by von Guericke's pump would not have been very good by today's standards. It seems unlikely that it could have reduced the pressure beyond a few torr. Even today, however, no single vacuum pump exists that is able to exhaust a system from 760 torr to 10^{-6} torr rapidly and at low operating cost—and these two criteria are particularly important in a production situation. For this reason, most systems are evacuated in stages (usually two), employing a different type of pump for each stage.

The first stage is known as *roughing*. The majority of the roughing pumps employed in both industry and the research laboratory are of the *oil-sealed rotary* type, illustrated schematically in Figure 1. A pair of spring-loaded vanes sweeps out a crescent-shaped volume which increases from effectively zero on the intake side to a maximum, and then decreases to effectively zero on the exhaust side, compressing the trapped gas and expelling it to the atmosphere through a check valve. As the name implies, the seal between the vanes and the stator, and between the top of the rotor and the stator, is maintained by a film of specially-processed oil, which also provides lubrication.

The oil used in these pumps must be highly refined to reduce its *vapor pressure;* otherwise, evaporated oil molecules would flood the system. This is an important concept, since all materials have a

characteristic vapor pressure, although at room temperature it is infinitesimally low for some (most metals, for example). Vapor pressures are strongly temperature dependent, and materials for use in vacuum systems must always be chosen with operating temperatures in mind.

An oil-sealed rotary pump has the capability of reducing the pressure in a system to 10^{-3}–10^{-4} torr. The *ultimate pressure* is limited to this range principally because a compromise must be made between the vapor pressure of the oil and its lubricating qualities. The use of special materials and techniques may extend this range to 10^{-5} torr, or even 10^{-6} torr—at greater cost in both operating expense and pumpdown time—but the resulting vacuum is of little practical use: the *pumping speed* at these pressures is very low.

Pumping speed is a most important consideration in the design of a vacuum system, particularly when the system will be used for vacuum heating of materials. In order to vacuum evaporate a material rapidly, it must be heated to a temperature at which its vapor pressure is many times greater than the pressure in the system; often, this is 1,000° C or more. At such temperatures, large volumes of absorbed gas and water vapor are liberated from the evaporant charge. Also, the parts of the vacuum system itself that have been heated by radiation or conduction from the hot evaporation hearth will begin to *outgas.* If the gas is liberated from these sources at a rate greater than the pumping speed of the pump, the pressure in the system will rise to an intolerable level.

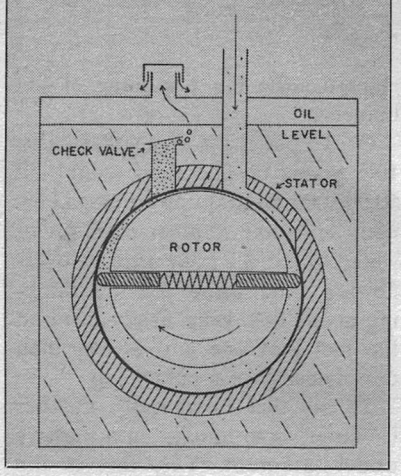


Figure 1, Oil-sealed rotary pump. As the rotor turns at about 350 rpm, the spring-loaded vanes sweep out a crescentshaped volume, compressing the gas and forcing it out through the check valve. The pump is immersed in oil for cooling.

Vacuum heating plays an indispensable role in many areas of technology. A new 30,000-ton-per-year steelmaking plant is entirely pollution-free, due to a process called "electron beam continuous hearth refining." High-purity, corrosion-resistant steel is produced in a 75-foot-tall vacuum furnace, where twenty-two powerful electron beam guns heat the molten metal, liter-

ally boiling away impurities at a pressure of 10^{-4} torr. This plant produces no smoke, no fumes, and no ash.

It would be impossible to compound many of our space-age alloys if it were not for vacuum metallurgy. For example, a tantalum/tungsten/hafnium alloy that is used for rocket engine nozzles and re-entry leading edges is first vacuum melted by the electron beam method; this results in an initial ingot with exceptional purity. The ingot is then remelted in a vacuum arc furnace to increase its homogeneity. The product is a high-temperature alloy (3,030° C melting point) that is extremely ductile. In addition, further heat treatment of the material is carried out in vacuum, and fabrication is often accomplished by electron beam welding—also done in a vacuum.

Thus, many processes in the *high vacuum* range (10^{-4}—10^{-8} torr) require high pumping speeds. The problems encountered in attaining such speeds are manifold, and they are compounded by the fact that the character of the gas flow from the chamber to the pump undergoes a radical change at about 10^{-4} torr. At higher pressures, the gas behaves as a true fluid, since each molecule is influenced by its neighbors. This results in a smooth, orderly flow from the higher pressure region (the chamber) to the lower pressure region (the pump).

At 10^{-4} torr, the mfp is about 50 cm, a distance that could be equal to or greater than some dimensions of the system. At this and lower pressures, molecules of the residual gas collide with the walls of the system much more frequently than with each other, and the "flow" is no longer a true flow, but a random bouncing of molecules from wall to wall. The progress of a gas molecule from the chamber to the pump becomes strictly a matter of probability. At pressures below 10^{-4} torr, therefore, pumping speed becomes a function of the size of the intake orifice of the pump: the larger the intake orifice, the higher the probability that a given molecule will find its way into the pump.

In addition to their other drawbacks, it is impractical to build oil-sealed rotary pumps with large intake orifices, so a completely different type of pump must take over at about 10^{-3} torr to reduce the pressure into the high vacuum region with good-pumping speed. In most commercial and research systems, this pump is the *vapor diffusion pump,* diagrammed in Figure 2.

In this type of pump, a fluid (mercury, or an organic or semi-organic oil) is heated in the boiler; the vapor generated passes up through the tower structure under pressure, to be ejected at high velocity through annular nozzles. Gas molecules which wander into the first rapidly moving vapor streams

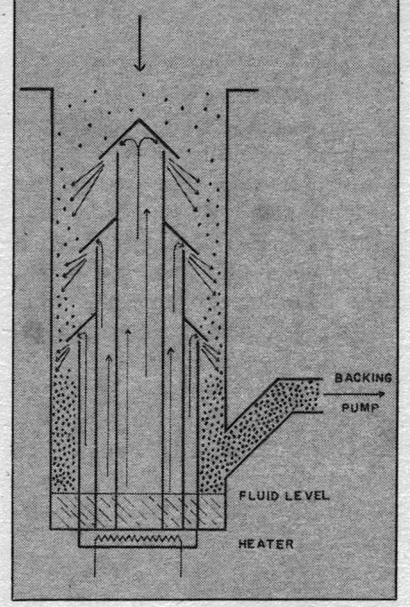


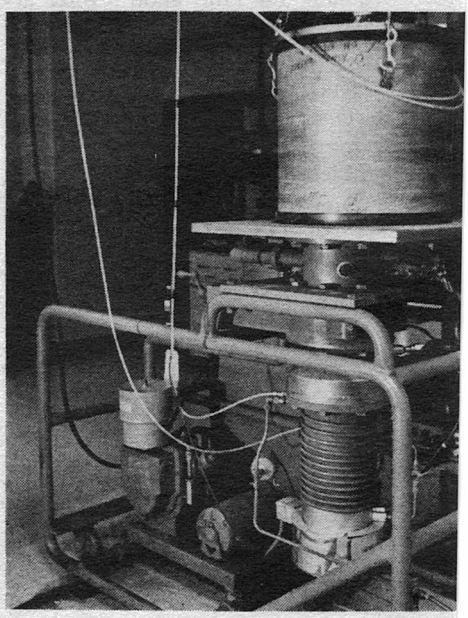
Figure 2, Fractionating oil vapor diffusion pump. Gas molecules that wander into the pump are forced downward by the rapidly moving vapor streams. The gas is compressed by successive vapor streams until it is at a high enough pressure to be removed by a backing pump. The oil vapor is condensed on the pump walls, which are usually water cooled, and runs back to the boiler.

are struck by the heavy vapor molecules and are directed downward, where they encounter the vapor streams of lower nozzles. The vapor itself is condensed on the cool walls of the pump and runs back down into the boiler to be recycled.

The net effect, then, is to impart a rapid downward motion to the gas molecules, compressing them at the base of the tower where they are removed by a *backing pump;* usually, this is the same oil-sealed rotary pump that was used to rough the system initially. The vapor diffusion pump is isolated during roughing, since the hot fluid oxidizes at pressures above about one torr.

The fluids used in oil vapor

Figure 3, High vacuum system of moderate size. The oil vapor pump can be seen extending below the stainless steel vacuum chamber; the oil-sealed rotary roughing/backing pump is at the left. This system has an ultimate pressure of 5×10^{-8} *torr; it is used for electron beam heating of refractory metals.*



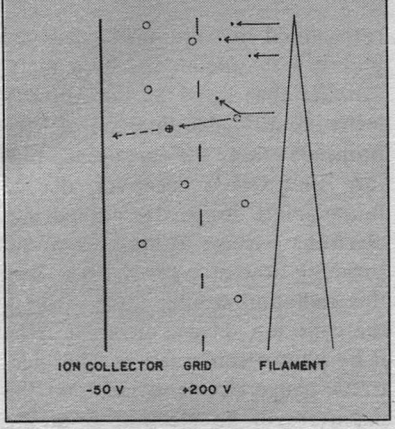


Figure 4, Electrode structure of the Bayard-Alpert ionization gauge. Electrons accelerated from the filament to the grid ionize residual gas molecules; these positive ions are then attracted to the ion collector, and the resulting ion current is read on a meter.

pumps are highly refined hydrocarbon oils, semiorganic silicone oils, or esters. They have low vapor pressures, 10^{-7}—10^{-11} torr, but they are prone to break down into higher vapor pressure fractions which severely limit the ultimate pressure of the pump. Most oil vapor pumps are therefore of the *fractionating* type, which is the type shown in Figure 2: the tower is composed of concentric cylinders, each terminating in its own nozzle. The nozzles are at progressively higher levels, going from the outer cylinder to the inner. The bases of the cylinders are slotted in such a fashion that the oil must follow a maze-like path to reach the innermost cylinder; it has thus been heated for some time, and the higher vapor pressure fractions will have been boiled off and forced out lower nozzles. The vapor exiting from the topmost nozzle—the one nearest the vacuum chamber—should then, in principle, contain no high vapor pressure fractions.

Mercury has the advantage as a pump fluid that, being an element, it cannot decompose. However, it has a relatively high room temperature vapor pressure, 10^{-3} torr, so a refrigerated cold trap must be interposed between the vapor pump and the vacuum chamber. At -190° C the vapor pressure of mercury drops to 10^{-12} torr; for this reason, liquid nitrogen (LN_2), which has a boiling point of -196° C, is often used to cool the trap.

The vast majority of high vacuum systems in vacuum evaporators, electron beam heaters, vacuum arc furnaces, electron microscopes, and countless research applications are of the rotary oil-sealed/vapor diffusion type. A typical research system is shown in Figure 3.

At this point, it is reasonable to ask how a pressure of, say, 10^{-7} torr is measured. A column of mercury is quite useless: 10^{-7} torr is equivalent to 10^{-7} millimeters of mercury, a "column" less than one atom high! It is, therefore, easier to measure the concentration of gas molecules in a vacuum system than to measure the pressure exerted by

them. The *ionization gauge* is commonly employed for this purpose.

Figure 4 illustrates the principle of this device. Electrons emitted by the heated filament are accelerated to the grid, which is maintained at +200 volts. On their way to the grid, some of these electrons collide with and ionize residual gas molecules. The positive ions thus formed are attracted to the ion collector, a thin wire charged to about -50 volts, and the resulting ion current—proportional to the number of ions formed, and therefore to the number of residual gas molecules—is read by a suitably calibrated electronic circuit. The ionization gauge may be enclosed in a glass envelope and connected to the vacuum chamber via a short length of glass tubing, or the open electrode structure may be placed within the chamber.

It is worth digressing for a moment to discuss the development of the modern ionization gauge, since this has had a most profound effect on the progress of vacuum science and technology. By the mid-1940's, a limit to low pressure attainment seemed to have been reached. No combination of traps, baffles, pumps, and efforts of design and operating technique could produce pressures—as read—lower than 10^{-8} torr.

Ionization gauges in those days were built much like the triode electron tube: a central filament surrounded by the grid, and the grid in turn surrounded by a metal cylinder that acted as the ion collector. In 1947, Nottingham of MIT proposed that the apparent 10^{-8} torr limit was a deception due to faulty gauge design. He argued that electrons arriving at the grid would produce low-energy X-rays, and this radiation would, upon striking the collector, release electrons from it by photoelectric action. The electronic gauge circuit would treat the departure of an electron from the ion collector the same as it would treat the arrival of a positive ion: a current would be registered, even if the gauge were operating in a perfect vacuum!

Within about two years, Bayard and Alpert of Westinghouse Research Laboratories had solved the problem. An ion collector in the form of a thin wire would, they reasoned, still collect most of the ions, due to the negative charge on it; but only a fraction of the X-rays would strike an electrode with such a small cross-section, since this radiation is unaffected by electric fields. Shortly thereafter, Alpert constructed a more-or-less conventional system that reached 5×10^{-10} torr, as read on their new gauge. Thus, the age of *ultrahigh vacuum* was born.

The impetus toward producing lower and lower pressures was (and still is) partly pure scientific curiosity—but there are many practical uses for ultrahigh vacuums. A pres-

sure of 10^{-8} torr is a good vacuum for many purposes, and it represents a not inconsiderable achievement in terms of sheer numbers: at that pressure, 99.999999999 percent of the air initially present in the vacuum chamber has been removed. On the other hand, again in terms of sheer numbers, there is still a lot of gas present: about 10^8 molecules/cm^3. Many commercial and research operations require further reductions in gas concentration.

If a very sharply pointed wire is subjected to a strong electric field, it will release electrons from its tip by *field emission;* this is the principle of the field emission microscope, a remarkable instrument that allows the study of the tip on an atomic scale. At the University of Chicago, A. V. Crewe and co-workers have designed and built a scanning electron microscope that is able to resolve single atoms of uranium in organometallic compounds; this amazing capability is due, in part, to a field emission electron source that produces a focused spot of electrons only 5×10^{-5} cm in diameter. Field emission tips provide current densities of up to 100,000,000 amperes/cm^2, which makes them excellent electron sources for high-speed X-ray tubes and high power special-purpose electron tubes.

If field emission were initiated in an ordinary high vacuum, the tip would rapidly be destroyed. Ions formed from the residual gas would be accelerated to the tip in great numbers and would, upon striking it, knock atoms from it. This process is known as *sputtering,* and it can remove large amounts of material in a surprisingly short time. By reducing the pressure in the system to 10^{-11} torr, the lifetime of the tip is greatly extended.

Maintenance of gas purity at low pressures requires ultrahigh vacuums. If, for instance, it is necessary to maintain an impurity level of one part per million in a gas at 10^{-3} torr, the experimental vessel must be evacuated to 10^{-9} torr before the sample gas is introduced. This is especially important in the study of thermonuclear fusion, the process held by many to be mankind's sole hope for power-hungry future generations. Attainment of the necessary plasma temperatures depends, to a great degree, upon the ability to produce a plasma uncontaminated by heavier elements; this requires initial pressures in the ultrahigh vacuum range.

Perhaps the greatest single use for ultrahigh vacuums, in both industry and the research lab, is that of reducing the rate of gas molecule impacts on a surface. All solid surfaces are obscured by a film of adsorbed gas; this film may be removed by heating the material in a vacuum, but upon cooling it will begin adsorbing residual gas. At 10^{-6} torr, a good vacuum by many standards, the rate of collision is

approximately 10^{14} molecules/cm^2/second and, while not all of these stick to the surface, enough do to cause complete coverage in a little over two seconds. At 10^{-10} torr, the rate of collision is decreased by a corresponding amount, and it will take over six hours for complete surface coverage.

The success of many modern research techniques hinges on ultraclean surfaces. Low energy electron diffraction (LEED) is a good example of such a technique, since it is a relatively new and very powerful research tool. If a beam of electrons is directed into a material, it will be reflected in a characteristic diffraction pattern that is unique to that particular material. A beam of high energy penetrates the surface, however, and yields results related to the interior of the material; to study the actual surface, LEED is needed—but LEED will not yield significant results unless the surface is scrupulously clean and free from adsorbed gas. A pressure of less than 10^{-10} torr is required to maintain the clean surface for a useful length of time. At somewhat higher pressures, around 10^{-9} torr, the gas adsorption process itself can be studied by LEED.

Adsorption from the residual gas will occur even while a surface is being formed. As was mentioned before, residual gas will become occluded with an evaporated film, as gas molecules impinge on and stick to a surface, and then become covered over with subsequent evaporated material; these gas molecules constitute an impurity in the film. For many applications, the impurities resulting from evaporation at, say, 10^{-7} torr can be tolerated; however, the levels of these impurities may be hundreds of parts per million—intolerable levels for many semiconductor devices. A reduction in pressure by a factor of 10^3 to 10^{-10} torr will result in a correspondingly large reduction in impurity levels. This is important, since vacuum evaporation is a popular method for the fabrication of integrated circuits.

Our space program would have been hindered, had it not been possible to approximate the ultrahigh vacuum of space in terrestrial laboratories. The pressure in space ranges from 10^{-9} torr 450 miles from Earth to 10^{-16} torr between the planets—and still lower in interstellar space. At these pressures, lubrication becomes a particularly acute problem: liquid lubricants boil away—rapidly or slowly, depending on vapor pressure—and many solid lubricants simply cease to be lubricants. NASA scientists have found that vacuum-evaporated gold films can be used as lubricants on rotating or sliding spacecraft components. The research that yielded this information was, of necessity, conducted under ultrahigh vacuum.

Flexible seals and gaskets for use

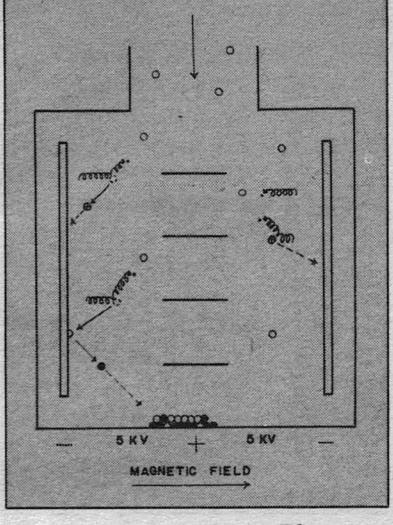


Figure 5, Ion pump. Electrons (black dots), constrained to move in spirals by the magnetic field, are accelerated toward the anode structure. Gas molecules (open circles) struck by these electrons are ionized and accelerated to the titanium cathodes, where they sputter titanium atoms (black circles). This results in a continuously replenished titanium film on the pump walls, which getters chemically reactive molecules and physically covers inert gas atoms. Energetic ions are buried in the cathodes by force of impact.

in spacecraft must be carefully formulated and tested, as many materials which function perfectly well in a high vacuum contain components that evaporate under ultrahigh vacuum. This can embrittle the material, causing sudden failure.

Metals that break under repeated flexure at pressures greater than 10^{-9} torr show markedly improved resistance to this type of failure in ultrahigh vacuum. Microcracks that form as the metal is bent will reweld themselves when the bend is reversed; at higher pressures, adsorbed residual gas prevents this type of healing. This is, of course, a beneficial effect of an ultrahigh vacuum environment—one of the few, from the viewpoint of a spacecraft designer—and it suggests an interesting possibility: since ultraclean metal surfaces will weld when pressed together, this may be a practical method for constructing spacecraft *in situ.*

Vapor diffusion pumps are capable of producing ultrahigh vacuums, but they must be trapped. Even a fractionating pump backstreams some vapor molecules into the vacuum chamber, and it doesn't take many of them to destroy an ultrahigh vacuum. Very efficient traps may reduce backstreaming considerably, but in general, the more efficient the trap, the larger the portion of the intake orifice of the pump that it blocks off: the pump is, in effect, choked by the trap.

For this reason, ultrahigh vacuums are usually produced by *ion pumps.* This device differs significantly from the pumps so far discussed in that it is purely electronic in nature, and it operates by permanently immobilizing gas within it, rather than expelling it to the atmosphere.

The cathodes of an ion pump (see Figure 5) are made of titanium, a very reactive metal that sputters readily. The entire pump is placed in a strong magnetic field, and a potential of about five kilovolts is impressed between the cathodes and the anode to accelerate electrons present in the residual gas toward the anode. The magnetic field constrains these electrons to move in spirals, thereby increasing their path length and the probability that they will collide with and ionize residual gas molecules. The resulting positive ions are too heavy to be appreciably affected by the magnetic field, and they are accelerated directly to the cathodes.

The titanium of the cathodes is slowly sputtered away under this ion bombardment, and it condenses on the walls of the pump to form a continuously replenished film there; this film traps gas molecules by *gettering* (chemically reacting with them), or by physically covering them over.

In addition, ions striking the cathodes may be sufficiently energetic to bury themselves. Ion burial is an important process, as the inert gases helium, neon, argon, krypton, and xenon will not react with titanium. They would be pumped by physical entrapment in any case, but the pumping speed for these gases would be much lower if entrapment were the only pumping action.

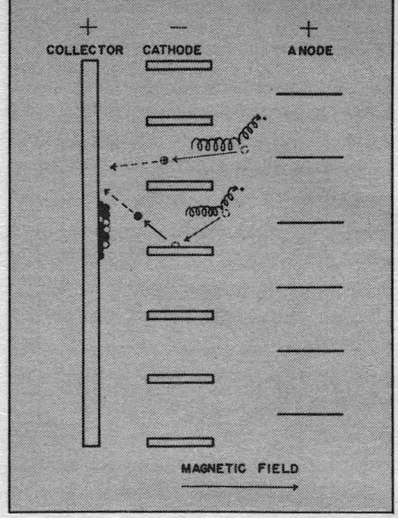


Figure 6, Half of a triode ion pump. Most ions pass through the open cathode and are directed to the collector, where they arrive with very little energy. There they are gettered or covered over by titanium sputtered from the cathode by ions that struck the cathode structure.

Ion burial, however, results in a detrimental pump action known as *argon instability.* As the cathodes are sputtered away, buried inert gas atoms may be uncovered and regurgitated back into the system; this may cause a pressure increase to as much as 10^{-4} torr before reburial again immobilizes them.

There are a number of methods for minimizing argon instability. The most common is the use of an extra set of electrodes called *collectors;* this results in an ion pump of the *triode* type, as diagrammed in Figure 6. The cathodes of a

triode pump are screenlike open structures, with the collectors positioned behind them; the collectors are positively charged, operating at the anode potential. Inert gas ions are attracted to the cathodes (along with other residual gas ions), but most pass through and continue on to the collectors. These ions have sufficient momentum to overcome the positive field, but because they are continuously slowed during the "uphill" trip between cathode and collector, they arrive at the latter with too little energy to re-sputter the film there. Upon arriving at the collector surface, they are covered over with titanium sputtered from the cathode by ions that did not make it through the cathode screen.

Ion-pumped systems must also be roughed, but with considerably more care than is necessary for a vapor-pumped system: backstreamed rotary pump oil vapor will decompose and form a carbonaceous film on the cathodes of an ion pump, seriously affecting its performance. Extensive trapping of the rotary pump will solve the problem, but it has been eliminated by a pump of relatively recent design.

The *sorption pump* is little more than a specially designed container packed with a sorbing material, usually a zeolite molecular sieve. Zeolites are materials having a porous aluminosilicate structure with an effective area of 10^3 square meters per gram. Gas adsorption takes place in the many spherical cavities within the material.

The sieve material is activated by heating the pump to about 350° C to drive off adsorbed water. The pump is then valved off and cooled with LN_2; then it is valved into the system, where it will begin to remove gas by sorbing it. An average-sized sorption pump is capable of sorbing hundreds of liters of gas before reaching saturation. A saturated pump is reactivated by reheating.

Normally the ultimate pressure of a sorption pump is about 10^{-3} torr, since gases such as neon and helium are sorbed very weakly, if at all. More complex procedures, such as multistage pumping or cooling with liquid helium rather than LN_2, will result in lower ultimate pressures.

A typical ion-pumped system, complete with sorption roughing pumps, is shown in Figure 7.

A pump that deserves at least passing mention, because of its unique design and currently increasing popularity, is the *turbomolecular pump.* This is a turbinelike device with a rotor and stator that consist of a series of slotted disks; the rotor spins at 16,000 rpm and the molecules struck by the angled slots in it are sent, on the average, in the direction of a backing pump. This type of pump will reduce the pressure in a system to 10^{-9} torr or less, with rapid pumping of the inert gases and no oil

vapor backstreaming; however, it is noisy and is subject to wear.

There are many other types of pumps, but the five discussed in this article are presently the most common. A histogram summarizing their approximate capabilities is given in Figure 8.

It should be evident by now that man has never produced a perfect vacuum—and probably never will, for a number of reasons. To begin with, the perfect pump has yet to be invented, or even to be envisioned, if you will concede that "workable" is an integral part of "perfect." At the other end of the system, it seems unlikely that the perfect vacuum chamber will ever be realized, and the tiniest of leaks can frustrate the most valiant effort: a good-sized ion pump will not be able to reduce the pressure beyond 10^{-12} torr in a system having a leak that admits one cm^3 of air in 300 years! In addition to these problems, outgassing of the system constitutes a virtual leak at low pressures; even though the system is baked to speed removal of adsorbed and absorbed gas, some outgassing continues indefinitely. Like the pursuit of the tortoise by Achilles, or the quest for absolute zero, man may approach ever closer to the perfect vacuum, yet never reach it.

This does not seem to be as bad as it may sound. The pressures of 10^{-13} torr that are now available to researchers are quite adequate for all but the most esoteric investigations; indeed, there is little qualitative difference between this and the 10^{-16} torr encountered on spaceflights. Commercial users of ultrahigh vacuums are more interested

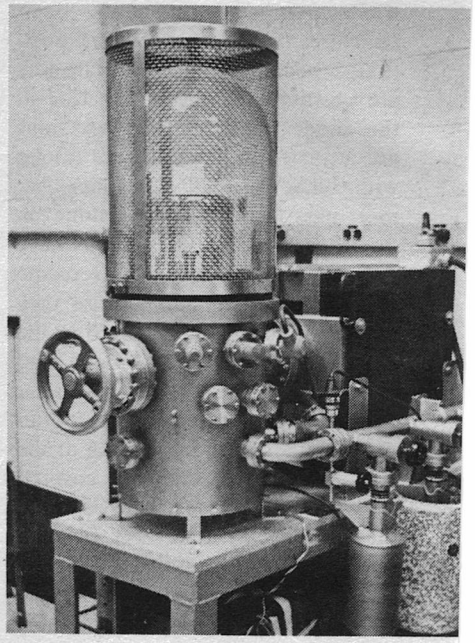


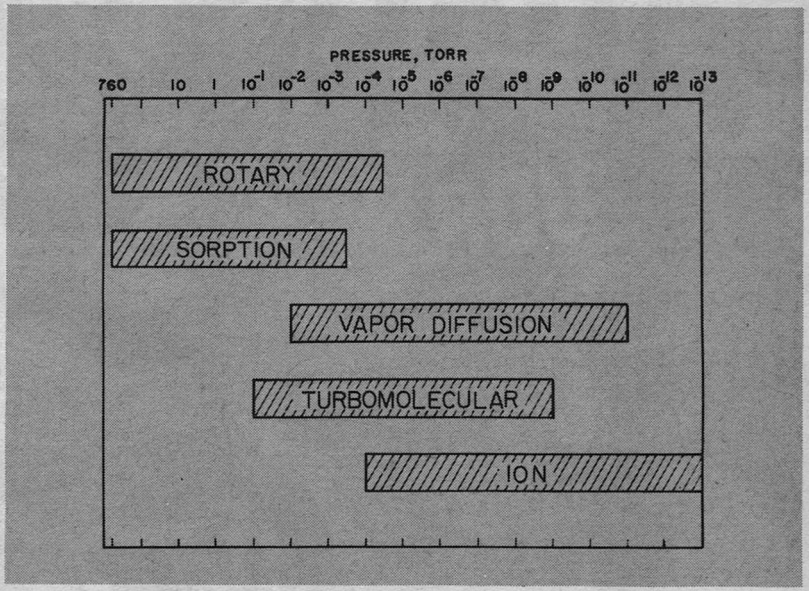
Figure 7, Ultrahigh vacuum system. The ion pump and its magnet comprise the massive structure extending behind the vacuum chamber. The sorption roughing pumps hang from the manifold at the side; the pump in the foreground has had its plastic foam LN_2 container removed. The ultimate pressure of this system is 10^{-10} torr; it is used for a variety of research processes.

in increased pumping speeds and lower operating costs than in lower pressures, and it is this type of improvement that is presently receiving the lion's share of attention from vacuum engineers.

Yet if another breakthrough like the one due to Nottingham, Bayard, and Alpert should occur (someone inventing the perfect pump, for example), it seems unlikely that an "ultra-ultrahigh" vacuum capability would lie fallow for long: spectacular laboratory achievements normally do not gather dust for more than a few years before practical uses are found for them—witness the laser.

On the other hand, it is entirely possible that we will have solved the problem in a rather unique fashion by the time a real need develops for ultra-ultrahigh vacuum—after all, the universe is full of it. ■

Figure 8, Approximate ranges of the various types of pumps discussed. These may be extended somewhat by special techniques.



ABOUT THE AUTHOR

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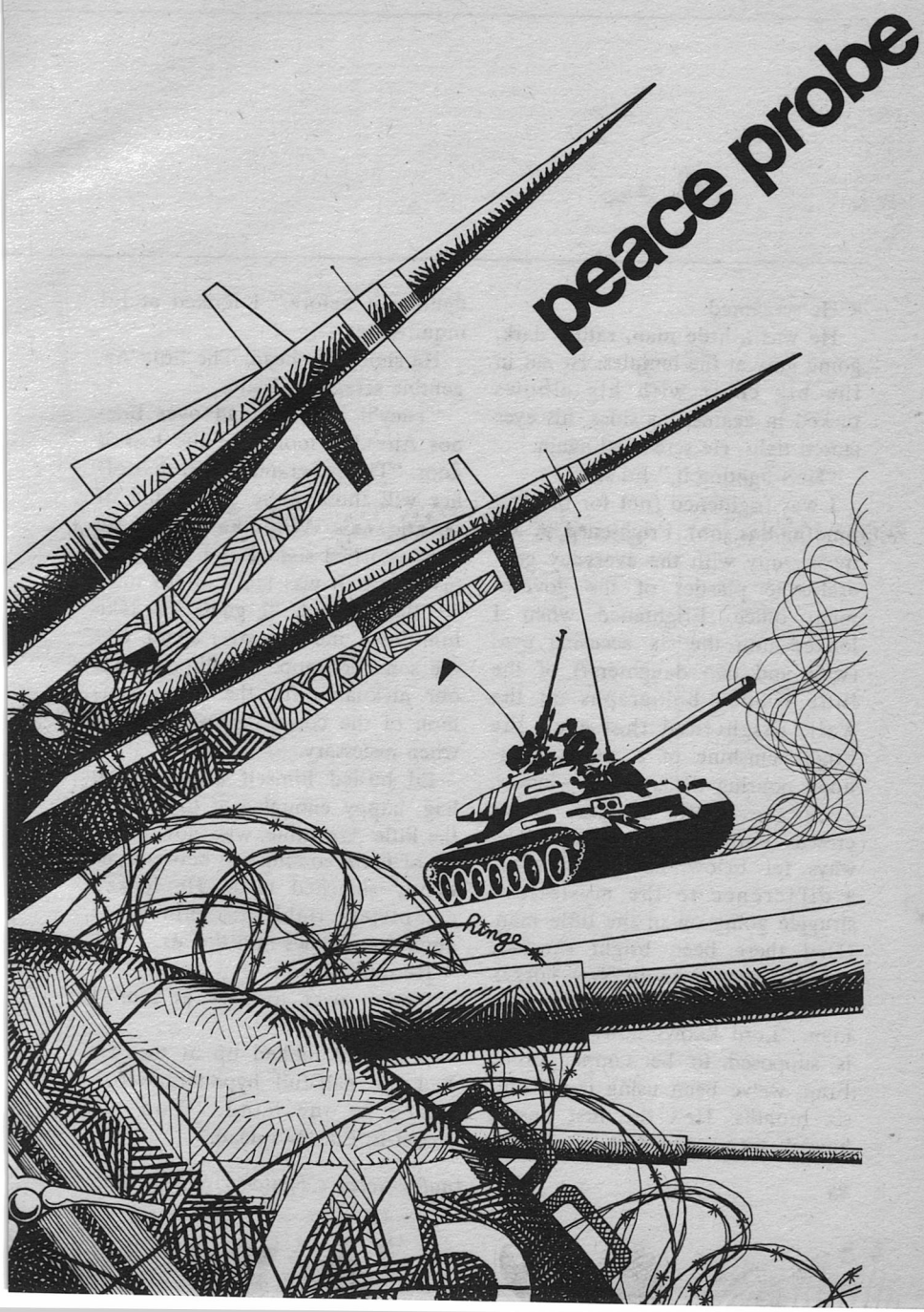
MIKE HINGE


peace probe
Ringe

■ He screamed.

He was a little man, rather dark, going gray at the temples. He sat in the big chair with his elbows tucked in against his sides, his eyes closed tight. He screamed again.

"He's fighting it," Ed said.

I was frightened (not for the first time in this job). Frightened at the incongruity with the everyday general-issue plastics of the government office. Frightened when I looked into the six accusing eyes (wife and two daughters?) of the little framed holographs on the wall. Frightened that even the bright sunshine of a spring afternoon pouring through the window, even the placid Buenos Aires crowds borne along on the slideways far below, could not make a difference to the mysterious struggle going on in the little man. (Had there been bright sunshine too, that spring day in New York?)

"I know." I stared at the little man. "Lord knows how. This stuff is supposed to be tamper proof. Frap, we've been using it for only six months. He's the first one. I haven't seen a red flash on anyone fighting it before." I looked at Ed inquiringly.

He shook his head. The little Argentine screamed again.

"They'll hear him all over Buenos Aires." I looked at the locked door. "The programmers in that office will think we're some kind of sadistic nuts. Why the hell is he fighting it?" I sighed and looked at my watch. It was ten minutes since we had started. "I guess I'll take him down and start over again. Get me some lollipop." "Lollipop" was our nickname for the most common of the counteragents we used when necessary.

Ed busied himself in the black bag, happy enough not to look at the little Argentine, who now had a bit of foam coming out between his tightly clenched teeth. He looked completely rigid, his chin tilted about two inches into the air.

He relaxed.

I went over to look at him. I looked again.

"Ed." Ed looked up at me. He had the half-full hypodermic balanced in one hand. "You can forget it, Ed. He's dead."

In certain situations
it's necessary to speak strongly—
and carry a big stick.

ROY L. PROSTERMAN

"Oh, crap!" He dropped the hypodermic back in the bag and snapped the bag shut. In two steps he was stationed by the door, holding his laser gun. Ed still moved with the speed of an All-Hemisphere from Massachusetts Intertech. (Ten years ago. Was it that long? When football was just getting started again.)

I switched on my pocket communicator and called in the day code. "Team nineteen," I said. "Colonel Herrera just died on us. He was frozen tight. No responses. Time of death approximately fifteen minutes from administration. Slight foaming at the mouth. Cause of death unknown."

There was a pause at the other end. By that time there were probably seven tons of brass patched into regional HQ.

"Johnson?" There were. That was General Arlo's voice.

"Yes, sir?"

"That's the second Argentine in two days. We hadn't gotten out a red flash yet."

I could see Ed shaking his head and muttering "damn" or some equivalent under his breath. I felt the same way. (And all this for only fourteen thousand new dollars a year. Sometimes I wished I had a nice quiet practice in clinical psychology.)

"What do you want us to do, General?" I knew what was coming.

"You're the senior man in sector, Johnson. Keep your communicator open for continuous monitoring of your safety." He paused. By that time, I imagined they probably had Secretary Handley patched into the network, if not the President himself. Time dragged. "Johnson?"

"Yes, General Arlo?"

"We are declaring a full sector emergency. Thirty teams are en route, with ETA's from one to three hours at Buenos Aires. Any interference will result in immediate nuking of Buenos Aires. Ready for the drill?"

"Yes, sir."

(Shudder.) They are right when they talk about your stomach being a cold, tight ball. This was only the eighth sector emergency since the Unilateral Declaration. (Eight times

in eighteen years.) It was my second. I didn't like it. I wished there were someone more senior in the country, even though, as of now, sector HQ would be making all the big decisions.

There would be three twelve-unit flights of two-phase five-megaton missiles on their way to Argentina now. Ten minutes in ballistic trajectory, then circling in air-supported flight responding to sector's orders. Destroy Buenos Aires. Don't destroy Buenos Aires. They were the first step in the drill.

"Mr. Johnson?" It was a new voice. The President.

"Yes, sir?"

"I have been in direct touch with President Argeles of Argentina." He sounded tired. "You have full liaison authority. He assured us of his cooperation. He was probed just ninety days ago, and it is highly unlikely that he is involved. Remain open for monitoring, and be careful," he added unnecessarily. "This is your second time?" (The ball in my stomach was tighter. Like the last time, and like twenty years ago.)

"Yes, sir."

"Good luck."

"Thank you, Mr. President." (Tighter. The young medic picking his way through the rubble of a Boston suburb during Restoration, M-20 in his right hand and bag in his left.)

By the time we finished, Ed already had the palm-sized TV on. I flipped all the channels. They were the same. A mustachioed general was giving orders to the population. The government was cooperating. The drill was on. I tuned the radio wavelengths for comparison.

Same voice, same words. By now, I was out the door and watching the picture in the elevator leading up to the roof and our servo-copter. Ed would lock the door behind me and stay with the body. We were very interested in knowing how he had fought us; we wanted that body. I stepped into the copter's cabin and asked sector to punch in the coordinates for wherever the general was speaking, still keeping one eye on the TV.

"A maximum international emergency has arisen," he was saying. "Certain madmen appear to be conspiring against world order. Their plans will be laid bare. In the meantime, absolute cooperation of the population is required. The following steps are proclaimed, effective immediately and throughout the country."

He was an impressive speaker. He consulted a card in his hand. His notes on the drill. The big servo-copter was whispering low over downtown Buenos Aires by now, doing an elbow around the mile-high Peron Building.

"First," he went on, "martial law is hereby proclaimed throughout Argentina. An unlimited curfew is

declared. Authorized emergency officials and officials of the Unilateral Declaration Agency are the only persons permitted on streets, highways or in the air. Noncompliance is a capital offense. Remain in your homes or offices. Stay where you are now." He looked at the card again. "All private communication by telephone, radio or other means is forbidden. Emergency officials will patch into the UDA network by portable communicator. All telephone exchanges are now being occupied by the national police. Random monitoring for direct push calls and for private radio transmissions is now underway. Again, this is a capital offense. The survival of the nation depends on the most scrupulous obedience to UDA policy directives. Even the slightest failure means death."

Fine so far, movement and communication.

"Moreover, since the plots of the wrongdoers in our midst may depend on the availability of power, all power will be suspended immediately following this broadcast. All electrical power plants are now under military control. Keep your television and radio sets turned on. If additional communications are made, power will be temporarily restored for that purpose. Emergency power arrangements for hospitals should be put into effect at once. Other auxiliary power arrangements are strictly prohibited."

Movement, communication, power. The UDA servo-copter with its white crosses against a red background was coming down on another roof. Half-a-dozen armed men were there to hustle me below. I kept the little TV in one hand.

"Finally, to assure that the plotters do not achieve their ends, all production and trade are hereby suspended. Any production lines not halted by the stoppage of power must cease immediately. Most particularly, all production lines involved in the production of drugs, chemicals, biological materials or lasers, or utilizing nuclear materials must halt immediately, and will be placed under military guard within two hours. All nuclear reactors of whatever kind, for experimental or other purposes, will be shut down immediately. All other production facilities will cease. Also, all trade and retail sales will cease, except for the supplying of food to persons already on the premises. Some persons may, without their knowledge, be inadvertently supplying the plotters with some category of goods or products which they require."

I stopped looking at the TV. Now I could look up and see the general himself, standing solidly against the brightness of the studio lights.

"Again," he was continuing, "failure is a capital offense."

No copters, slideways, or telephones. All power plants shut

down. Add to that no producing and no selling, and you just about had the full drill. In five minutes, Argentina had moved back from the last decade of the Twentieth Century to a collection of medieval villages. And you could at least walk around in a medieval village. Try that here, and you'd be shot. If there were any plotters, they were going to have a hell of a time gathering their forces.

Now there would be a little sweetener.

"All losses suffered because of this emergency, except for claimed losses of production and sales, will be compensated. The Unilateral Declaration Fund and the Government of Argentina will share equally in making good all claims. The UDA also authorizes me to declare that the customary award for information leading to the arrest of violators will, during the period of the emergency, be increased to twenty million dollars in gold. Persons wishing to communicate on this subject will push the special telephone code 999, and their information will be taken."

Perfect. The lights went out and the general stepped back. He had his handkerchief out, wiping away the perspiration.

"Señor Johnson?" He stared at my armband for a moment, but his grip was firm. He was grim. Not frantic, but dead worried. (Tighter. By now that salvo of five-megaton buzz bombs was circling overhead.) One of my chief jobs as Johnny-on-the-spot was to get a direct visual impression of key personnel in the government. ("Frankenstein-on-the-spot," she had chuckled, when I used the phrase, and started crying in the middle of her chuckle.) No one had yet been able to build as much suspicion into an external monitor as there was in a UDA prober. General Uberto-Jackson, as minister of defense, was top man in this government. I would stop and probe if I had to, but I didn't want the mover-and-shaker disoriented for the next twelve hours if I didn't get at least a taste of suspicion.

After two minutes of conversation, I would have laid long odds that the general was O.K. and on our side all the way. Another five minutes and I had checked out details of the drill, such as use of army units picked at random to carry out the emergency duties, with the rest confined to barracks. Unless the plot was very large, that meant the chances were remote that the very guys who were moving around were the ones we didn't want to move around. Moreover, the generals got probed so often that the army was not usually where the rottenness lay. In the seven previous full alerts, the army (this one was in Albania) had been implicated only once.

"We have done everything you ask?"

"The drill was perfect, General.

I'm sure we'll have this straightened out soon."

"I hope so, Mr. Johnson. I love my country. I do not want it destroyed."

There's not much you can answer to a line like that. I was happy when my communicator buzzed. It was Arlo.

"Johnson, get up to a firm called Rio Rhine Pharmaceutical. We've had a nine ninety-nine on it, and it could fit. The call was terminated before we received any details."

I looked at my watch. Just half an hour since the little man died. Half an hour until the first supplementary probe team arrived. I had a second probe bag in the copter. "How far is this pharmaceutical firm?"

Uberto-Jackson was conferring with a young lieutenant. "It is on the outskirts of Buenos Aires. About ten minutes by copter. My aide will fly escort and give you every assistance." (Tighter. The other time, Colonel what's-his-name had said, "We'll blow it up for you" every time we'd had a lead.)

Escort apparently involved about thirty heavily-armed troops, in two accompanying copters. We were the only air vehicles in sight. We skimmed low over deserted slideways, and then over old-style streets as we neared the northern outskirts of the city. Their emptiness was periodically broken by a roadblock or a rumbling tank. I took a broad spectrum antibacterial. Might as well cut down my risks as much as I could. Not that it would do anyone much good to zap me, but I wanted to enjoy my pension, not get a posthumous Medal of Honor. (Frank Abernathy, our sector leader, had explained to him patiently, every time, why he couldn't blow it up. On the SuSt back to Washington, "Dr. Frank" had his heart attack.)

When we arrived, it was apparent we didn't need the escort. There was about a division, it looked, around the place, with twenty or thirty tanks aiming their laser tubes generally in the direction of the pharmaceutical plant.

The director of the plant was sitting in his big sunny office with a couple of rather shaky-looking laser guns pointed at his head. He was pretty near hysterical. That damned sunlight gave the whole thing a weird feeling. *(Had* it been sunny, in New York?)

I waved the soldiers away. I really didn't need to, in fact. They recoiled about three paces when they saw my red armband with its white cross. The director looked at my face, and then at the armband and just shuddered. He kept shaking his head from side to side.

"Can I see your organizational chart?" I wasn't getting through. He just mumbled that he didn't know anything. I opened my probe kit to get something that would pull him together. His eyes opened wide

when he saw the hypodermic.

"Don't get uptight. I'm just going to give you something that will help you think straight. Not a probe drug."

In a couple of minutes we had the organization chart out. The chief of pharmaceutical production looked like the place to start. If anyone knew of unauthorized use of the facilities, he should. It was a logical setup, too. They produced and killed plague bacilli for vaccines, and cultured a lot of other bacterial material that might be unpleasant in the wrong hands. (More logical than the other time. An atomic bomb, for God's sake! The morons were trying to build an atomic bomb! "They were suicide-prone, not conspiracy-prone," Frank had said to me on the plane. A few minutes later, he had slumped over.)

Since there was no telephone and no power, the director walked me down the long corridor to the production chief's office. With no exterior windows, it was gloomy. About ten soldiers crowded along behind. They held their guns tensely. One young soldier right in back of me was shaking so hard I could actually hear his teeth clicking together. If they were like me, they were trying hard not to think about those megatons circling over our heads. (One hundred and eighty megatons. Thirty tons of TNT-equivalent for every man, woman and child in greater Buenos Aires.) As we trooped down the corridor, clerks and technicians stared at me from the doorways, looking like rabbits fascinated by a snake. A couple of the women crossed themselves when they saw my armband. One man just folded his hands, sank slowly down on his knees and whimpered.

There were a couple of soldiers in the production chief's office, but he wasn't there. "Tell them where to look for him." The director started giving instructions. I looked around the room. It was modest, white and clean. In fact, it looked almost empty. There was very little in the desk drawers. On a hunch, I spoke into my communicator. General Arlo was there.

"General, can we arrange a search pattern, for—" I gave him the production chief's name and the particulars the plant director could furnish me.

I looked at my watch again. Ten minutes to ETA for the first supplementary probe team. (Tighter. I had always liked Buenos Aires. If I did much more waiting around, it would be my own teeth clicking together.)

Efforts to find the production director inside the plant weren't having any success. I asked for his assistant. He was hurried into his chief's office a moment later, a kid not much out of college. He looked scared out of his wits.

I worked quickly. First a sedative to calm him down. Then a buf-

fered chloryl-sodium-pentathol compound. One with a new radical, that wasn't the greatest thing for the system. But it was the fastest-acting thing we had. (There were six million people living in Buenos Aires.)

His name was Castellano. "What do you know about diversion of pharmaceutical materials, Señor Castellano?"

"Nothing. Nothing."

"No diversion for illegal or warmaking purposes?"

"No." I thought I sensed a pause, a tentativeness, in his drugged answer.

"Then how about any material taken out of the plant? Other than for regular commercial sales," I added hastily. They could be pretty literal-minded under the drug.

"Only for Señor Alvarez' research for the company," he said. "Nothing illegal."

I looked at the director. Alvarez was the name of the production chief. The director stared at me and shook his head.

"What research?" I asked.

"On the new plague vaccine. He took a hundred cc's of the plague bacilli to develop the new vaccine. It was very secret. So the competitors wouldn't know." He looked at me earnestly, as though to confirm my understanding that it was important the competitors not know. I'll bet it was important.

"When did he take these bacilli?"

"Approximately two months ago."

"Who else knew?"

"I don't know."

"Did he work with anyone on this project?"

"I don't know."

"Did he ever mention his work with these bacilli again?"

"No. Not to me."

"Did you call 999 today?"

"No, sir. No."

I had everything Castellano could offer. "And you solemnly swear you did not know that Alvarez was engaged in any unauthorized or illegal activity, or in the production of any weapons of mass destruction, or of any other prohibited category?" I wanted to get that straight for the record. They would be taking it all down at sector, over my open communicator. In a couple of years, the past one hour in the life of Thomas Johnson would be available, breath by breath, on thirty-track stereo tape, for any earnest Ph.D. candidate who wanted to write his thesis on "The Argentine Crisis of '98" and get into the Probe Corps.

"No," said Castellano. "I knew of nothing like that."

"You solemnly swear it?"

"Yes, sir." I gave him a downer.

General Arlo broke in on the communicator. "O.K., Johnson. Good work. If we can just find the s.o.b. The first two supplementary teams have arrived. Heath and Wellman are leading. I'll send them out there."

"Fine." We would probably have to probe everybody at Rio Rhine Pharmaceutical, from the busboys in the cafeteria on up, before the matter could be closed. *If* we found Alvarez. If we didn't, the question of probing Rio Rhine or anything else in Buenos Aires could well be academic. (One-hundred and eighty megatons, "UD overkill," my young army friend had called it, chuckling.)

"Johnson." It was General Arlo again. "They've got Alvarez holed up in his home. There's resistance, and I've told them not to storm it. Get over there and see if you can talk him out alive."

I was running as I left the plant door for the copter. I passed Heath and Wellman, on their way into Rio Rhine with their probe kits. We just waved. They'd get their instructions from the communicator.

Up again, over the dead streets. Farther out toward open country. We set down on a green lawn (still that damn sunshine!) near a house that had a lot of bristling armor pointed at it. I was introduced to a Major Rafael. He looked at my armband, flicked his glance at my eyes, stared at the house. He licked his lips twice before he could get the words out. "Alvarez is in there, apparently alone. He has a rifle. He also says he has the means to kill us all if we attack. He says they are germs. If he uses them, will you . . ." he didn't finish the question, just brought his eyes back to stare at me.

"The important thing is we've found Alvarez. And he looks like our boy. Don't worry." (Not as confident as I sounded. What if there were more Alvarezes? What if there were other germs?) "We've got to try to get him out alive. Are there any protective masks here?" Rafael said they were on the way. I had one, but I wouldn't use it, unless the soldiers had theirs. "Does Alvarez speak English, do you know?" Rafael looked over at another man, a civilian, who nodded.

I held my hand out for the bullhorn. "Alvarez." It was very quiet as I spoke. "My name is Thomas Johnson, and I am the senior sector officer of the Probe Corps. Do you hear me?"

Silence. The soldiers were all staring at me, no longer at the house. (Johnny-on-the-spot. Johnny-on-the-snot. Johnny-on-the-trot.)

"I am authorized to tell you that if you surrender and do not cause any more harm, you will be treated as a prisoner of war, as an officer under the Geneva Conventions. You will not be harmed." (You will be probed, but you will not be harmed.)

A high, broken voice came from the house: "I will not surrender. I will use these. I will kill you all."

I put on my most patient voice. "Dr. Alvarez, if you use those germs, you will accomplish nothing.

A few of us may die, and a few of your neighbors may die (but not if some masks get here quickly enough), but you cannot escape. By resisting you endanger the whole city. You know that, Dr. Alvarez. You know there are nuclear missiles up there right now. Whatever it was you planned to do with those germs, it's too late. You can only hurt your own people."

Silence. "Major Rafael, does Alvarez have any children?" Rafael looked over again at the civilian, and I could read his lips making the word *dos.*

"Dr. Alvarez. Do you want your two children to go down in history as the children of a mass murderer? As the children whose father was responsible for the destruction of Buenos Aires? Come out and you will not be harmed."

Silence.

Then a shot came from the house. I ducked reflexively. (But we all know what a single shot means, from years of watching the holoflix.)

"Alvarez?" No answer. After another minute, Rafael and I started moving slowly toward the house. For all we knew, we were walking into a fine mist of plague bacilli, wafting into the sunlight. (Mutated? And all for fourteen thousand new dollars a year? Tightest.)

But the two flasks next to the body were still sealed. Alvarez dead, not prettily, told us nothing. Before we went down to the basement and found a nicely-equipped lab and a freezer full of flasks, I sat carefully down in a chair behind a solid old wooden desk. I could see dust motes, against the sunlight falling on the desk. The desk top was warm and smooth to the touch. I took three very deep breaths. Then I asked for some water and washed down two pink tranquilizers. Strong ones. We weren't out of the woods yet, and UDA teams would continue to pour into the country, to make sure there weren't any more Alvarezes. But it was looking a lot better.

And that was how it kept on looking, although there were loose ends. We never discovered who gave us the nine ninety-nine. And Mrs. Alvarez has never been found. Apparently she had left the country a couple of weeks before, with the two Alvarez children. We lost the trail in Rome, and even though we've put a ten million dollar reward on information and probed every friend and relative in sight, we haven't found her. It just shows, we're not perfect. We only hope she's not sitting around some city with a batch of plague bacilli.

We're just about sure she isn't though, from the pattern of events that we pieced together.

Buenos Aires survived, of course. The Argentine Crisis of '98 is considered fully resolved, despite the missing Mrs. Alvarez. Alvarez himself was a member of an ultra-na-

tionalist group that thought of their country as a world power. If a dozen men with plague bacilli could be placed in major U.S. cities, they thought, then maybe they could deal with us as "equals." Maybe they could even blackmail us into giving them their atomic bombs back. Maybe they could even have what they called at their meetings a "foreign policy," meaning taking over some chunks of Chile they had disputed for a century-plus.

By midnight of that same day, I had enough of the pieces to authorize a preliminary clean bill of health. The thirty-six missiles were pointed east and nosed into the Atlantic. Headquarters bumped the alert status down from bright orange to medium yellow. I took two more tranquilizers. The Argentines got their electric power back, but we didn't give them their streets and slideways till next morning, and their phones till the morning after.

Very few high officials had been involved. The little colonel who had died (the sunlight flecking the foam) was the conspirators' highest-ranking military liaison. Unfortunately for him, he got picked out in our random quarterly probe of the Argentine intelligence service. Even more unfortunately, his death followed the death of a minor laboratory-supply official. They had worked out a pretty good technique for beating our most commonly-used drug. Good, except it turned out in practice—we extrapolated from chimpanzees—to give a 60-40 chance of heart failure. Now we always take a blood sample in advance, for the presence of possible interference chemicals. This is nice, because it means that a female lab technician, generally nubile, is attached to each of the two-man probe teams. Two hundred openings for nice female Ph.D.'s.

If it hadn't been for the conspirators' bad luck, they might have gotten through the first part of the plan. They were such small fish, they almost fell out of the net. Not the second part of the plan, of course. Plague or no plague. We'd have flattened Argentina before we would have given them back their A-bombs. People don't forget that fast.

We mean business.

The aftermath was pleasant. Two mornings, a couple of hundred probes and two suicides later, Ed and I climbed on a SuSt, exhausted but happy. (No heart attack for me.) General Arlo had a lot of brass and TV cameras gathered at the VIP lounge in the Washington airport. The network news gave us a big play, heroic saviors of world peace, and so forth. I suppose a few hundred more kids decided they were going to get their Q-clearances and try to go for Ph.D.'s in Psycho-Security Affairs.

My nephew Phil and his wife in-

vited me out to their country place in old Philadelphia, and I sat staring at the grass and at the new saplings donated by the JNF, and drank gin-tonics until I was pleasantly plowed. After dinner their youngest son, who was about five, came up shyly. He was looking at my armband with fascination. I motioned him up beside me and let him twist it around. Phil was beaming with amusement across the room. "Sir, please"—still twisting the red armband with its white cross—"what is this for?"

I met my nephew's eyes across the way. "Well, son, it's the badge of the organization I belong to. The badge of the Probe Corps. You see, way back in the middle of the century, before you or your daddy were even born, a lot of scientists were trying to make new ways to kill people." I looked to see if he understood. "New ways to hurt people, to do bad things. A man named Edward Teller invented the biggest way of all, and they called it the H-bomb. Now, of course, we call it after the man who invented it, and nice little boys don't use that word. But back when it was invented, everyone wanted to make them. By the late 1970's, eight countries had them, and there was enough explosive power in them to . . ." I looked across at my nephew ". . . to do very bad things.

"Then, about twenty years ago, one of the countries didn't like another country, and it used some of these weapons. And the other country didn't have bombs, but it had germs, and it sent some germs back against the first country. Pretty soon, everybody was using all the things the scientists had invented. For a long time, it was very, very bad." The little boy stared up at me, trying to understand. I knew he could not. It was beyond his experience, beyond even the furthest reaches of his imagination. But I would finish the story.

"Then, when all the bad things were over, America was the strongest country left. We were terribly weak, but we were stronger than anyone else. And we were determined that it would not happen again. The President was a very good and a very wise man, and he issued the Unilateral Declaration, so it would never happen again. And he set up the Unilateral Declaration Agency, which everybody calls the Probe Corps, so it would never happen again. And I joined it, and got this armband, so it would never happen again." I got up abruptly and walked up the stairs to my bedroom, Phil and his little son staring after me.

That night I had my nightmare again. This time, my nephew was having the heart attack, and the plane was flying over Buenos Aires, and then there was nothing there except a giant rumbling tank mov-

ing over the rubble, like a huge beetle. When I woke, my own heart was thumping wildly.

But the next day was warm sunshine, and my nephew's littlest boy came clattering down to breakfast wearing a makeshift "UDA armband." (Later, they wrote me that they couldn't even get him to take it off for bed.)

Around noon, I went back to Washington, where the hero's welcome was resumed. The President gave me a Peace Medal (and a raise!), and they had a banquet at the New Mayflower, where General Arlo presented me with a solid gold, inscribed copy of the Unilateral Declaration. I swear I got tears in my eyes when he handed it over. I lost most of my family in New York in '78, all except Phil, and I keep it on the wall, next to the little framed holographs of my dead sisters:

The United States of America, on December 31st of the anno Domini, 1979, as the most powerful nation surviving World War III, and determined forever to rid the world of the scourge of war, which in the past two years has taken more than one billion lives upon this planet,

DOES HEREBY SOLEMNLY AND UNILATERALLY DECLARE

FIRST, *that the possession, by any nation, entity or person other than the United States, of all weapons of mass destruction, including nuclear, thermonuclear, biological and chemical weapons, and of such other weapons, armies and armaments as the President of the United States shall from time to time designate, IS ABSOLUTELY PROHIBITED.*

SECOND, *that all nations, entities or persons possessing such weapons and armaments MUST INSTANTLY SURRENDER THEM.*

THIRD, *that all making of war by one country against another IS HEREBY PROHIBITED.*

FOURTH, *there is hereby created AN AGENCY FOR THE ENFORCEMENT OF THIS UNILATERAL DECLARATION.*

FIFTH, *all citizens of all nations SHALL SUBMIT TO SUCH PSYCHOPROBING AS MAY BE DIRECTED BY THE OFFICIALS OF SUCH AGENCY, CONCERNING VIOLATIONS, OR PLANNED VIOLATIONS, of the provisions of this Unilateral Declaration. Enforcement activities conducted within the United States shall be pursuant to legislative standards and safeguards established by the Congress. Enforcement activities conducted outside the United States shall include probing as to plans for creation or use of prohibited weapons, possession of such weapons, or plans for war, and may be carried out by hypnotic, drug or other techniques not causing avoidable injury*

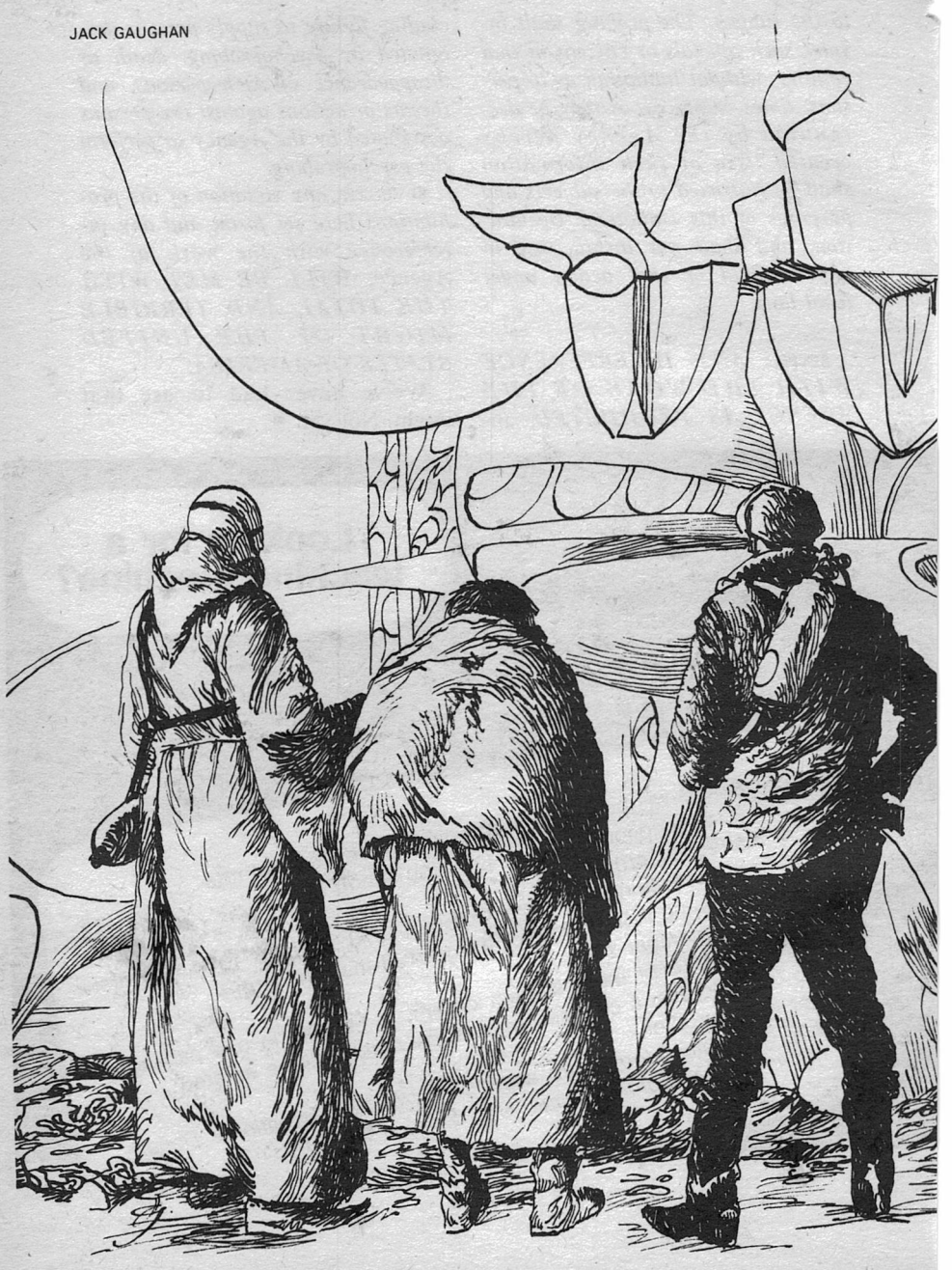
to the subject. The probing shall involve such officials or citizens of that country, without limitation as to persons, times or places, as may be designated by the Agency hereby created. Use of such information shall be restricted to the subjects and purposes of this Unilateral Declaration, and shall not include use in any criminal or civil action under local laws.

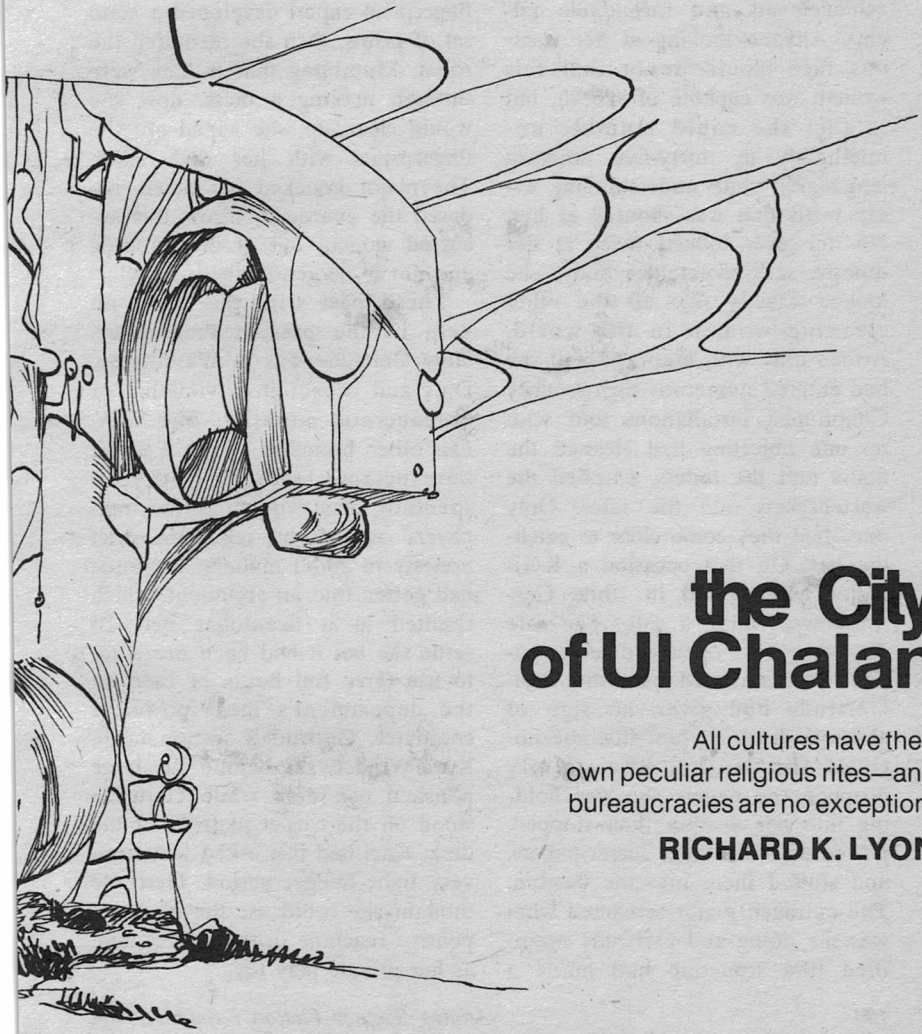
SIXTH, *ANY INTERFERENCE WITH THE WORK OF THE AGENCY IS PROHIBITED, including failure to supply persons designated by psychoprobing, death or disappearance of such persons, and threats or actions against the persons designated by the Agency to perform the psychoprobing.*

SEVENTH, *any violation of the prohibitions here set forth, and any interference with the work of the Agency, WILL BE MET WITH THE TOTAL AND TERRIBLE MIGHT OF THE UNITED STATES OF AMERICA.*

We've never had to use that might. Not yet. ■

JACK GAUGHAN





the City of Ul Chalan

All cultures have their own peculiar religious rites—and bureaucracies are no exception!

RICHARD K. LYON

I

Gertrude Eisenstein was one of the CIA's best agents, but now she was in a bad spot. Gertrude's position as one of America's master spies was a direct result of her great achievements and formidable talents. Anyone looking at her vacuous face would doubt that this woman was capable of speech, but in fact she could mumble unintelligibly in thirty-five different languages, while understanding every word that was shouted at her. No one ever looked twice at her dumpy, sack-of-potatoes body; she looked exactly like all the other cleaning women in the world. Armed only with mop and pail she had entered numerous high-security Communist installations and with no one objecting had cleaned the floors and the toilets, emptied the wastebaskets and the safes. Only once had they come close to catching her. On that occasion a KGB major had walked in while Gertrude was rifling a safe. The safe door was wide open and secret papers were scattered over the floor. Gertrude had given no sign of alarm, indeed, no hint that she noticed the major. She calmly dropped the papers she was holding into her dustbin then stooped, picked up some more secret papers, and stuffed them into the dustbin. The outraged major screamed what was she doing and Gertrude mumbled that someone had made a mess of this office so she was cleaning it. She continued cleaning and destroying evidence until the furious major ejected her from the room. The major then ordered the building sealed and summoned his assistants. Gertrude waited until the fingerprint expert developed a good set of prints, then she reentered the room. Mumbling that if they were through making a mess, now she would clean up, she wiped out the fingerprints with her dust cloth. The major knocked her down, ordered the guards to throw this accursed woman out of the building and not to be gentle about it.

These past triumphs were no help in the present emergency. Now Gertrude was in Washington, D.C. and caught in a violation of bureaucratic morality. The CIA, like other branches of the Federal bureaucracy, tends to justify its spending vast sums of the taxpayers' money by requiring strict honesty in small matters. Gertrude had gotten into an argument, which resulted in a five-dollar bet. To settle the bet it had been necessary to use *three* full hours of time on the department's most powerful computer. Gertrude's section head, Karl Winder, sat behind his large polished oak desk while Gertrude stood on the carpet in front of the desk. Karl had just asked why, in a very tight budget period, Gertrude thought she could use the most expensive machine in the government as her private play toy.

Gertrude thought rapidly. In terms of bureaucratic morality use of government property for personal recreation was a dishonest action. An agent with a brilliant record could be disciplined for a single dishonest act, but she could not be punished for a single mistake, however stupid. Therefore stupidity was a perfect defense. She gave her boss her best idiot smile and said, "But Karl, I discovered something which may be vital to the national defense."

That was a good beginning. At this outrageous statement Karl's eyes flared, but before he could shout his anger, Gertrude continued. "Let me review. J. Edgar Hoover's great contribution to the FBI was the recognition that file space is cheap. While other agencies discarded apparently useless information, the FBI accumulated. Soon this wealth made them a power. Allan Dulles made the next logical step, recognition that computer memory is cheap. We now have in the banks virtually the whole of human knowledge on many subjects. Our ability to correlate vast amounts of seemingly unrelated data has several times saved this nation from grave danger."

Gertrude was reviewing facts obvious to Karl. When she saw he was almost ready to shout, "I know that, you idiot," she got to the point: "What happened was this. I like to read 1920-1930 pulp magazines, especially stories about lost civilizations. George and I had an argument. He said that an unknown civilization was completely impossible because everyplace on Earth had been visited." All this was true; now for the lie which made her a fool rather than a knave. "After George and I made a bet, I realized that if a lost civilization existed, it could be very important to the national defense." There, she'd made her claim to acting in good faith, if foolishly. Now to tell the rest of the story in a manner which would support this claim. "I programmed the main computer to search the geography data bank for any area on which there was no information, then search the folklore bank for strange stories associated with any blank area. The computer found it: Ul Chalan. It's a high plateau in Northern Tibet. The natives are terrified of the place. There could be anything there, including a lost civilization."

At this Karl Winder exploded. "Gertrude, you have the brain power of a tinker toy computer. That is the most mutton-headed idea since the Bay of Pigs." Karl went on to make unfavorable comments on Gertrude's legitimacy, national origin, and hope of salvation. Whenever he appeared to be slowing down, Gertrude would try to interrupt.

This angered him to new abuse. Gertrude had been cursed by experts and to her Karl's rhetoric

seemed rather lackluster. Still, he was probably doing his best, and the more he overreacted now, the more he would want to forget the whole incident later. She was certain it would greatly annoy Karl if she cried. Slowly, very slowly, as if she was fighting to hold them back, Gertrude let tears form. The sight of a master spy (who had killed several men in the line of duty) crying did indeed greatly provoke Karl. Since he could not curse more skillfully, he raised his voice to the absolute limit his lungs would permit.

Only when he paused for breath did Karl notice that his phone was ringing, the *red* phone. He grabbed it and gasped, "Karl Winder, here." There was a pause, then, "Thank you, sir. We always do our best." Another pause. "Very good, we'll come to your office immediately." Karl hung up the phone, and turned to Gertrude. He looked at her. Perhaps the King looked at Chicken Little the same way when the sky really did fall. "That," said Karl, "was the Chief. He commended me and my section for our diligence in developing a new lead on the Ul Chalan crisis. The President needs a recommendation by noon and we are to bring all available information to his office immediately."

The Chief's office was heavy with brass. The meeting was called to order and the Chief asked Karl to present his information. Karl had no information, so he replied, "This is Gertrude's work and I think you'll get a clearer picture if she explains."

Gertrude spoke in a flat, expressionless voice: "Ul Chalan is unique in that it is the only place on Earth no one has ever reported visiting. That covers all published civilian reports, all American military reports, ditto the British, French, German, et cetera. The pipeline to Russia and China is a little slow but effective. If either of them visited Ul Chalan, it was within the last six months. The native Tibetans are scared of the place, but don't know why. They have all manner of strange stories concerning it. The only common thread to these stories is that Ul Chalan is the home of Sothatalos, the Old One."

The next speaker was an Air Force general: "Two weeks ago, routine satellite photographs showed a full division of Red Chinese tanks moving through Northeastern Tibet. On each pass of the satellite the Chinese were moving steadily until last Friday. A few miles from Ul Chalan the entire formation stopped completely. There has been no motion since then. The Chinese are standing still in a position normal for travel, but absurd for camping. Prior to Friday we observed electrical activity from the Chinese tanks, people using radios, radar, et cetera. Since Friday

nothing. Saturday I ordered an orbit change, so that another satellite, one equipped with heat sensors, would pass over Ul Chalan. It saw nothing. The Chinese are motionless, are not using electricity, and are not making fires. It is my conclusion that they are dead."

The general was followed by a colonel: "As you know, the firing of a missile produces considerable atmospheric ionization which can be detected by radio reflection. At 0800 hours GMT Sunday, we observed a single missile firing from a base in Western China. The signature was that of a medium-range missile. Initially we thought they were testing and no threat was posed."

The colonel was followed by a CIA meteorologist: "On Monday several of our air monitor stations in India detected a release of radioactive material. Using weather satellite, wind velocity data, I calculate the release occurred Sunday morning within fifty miles of Ul Chalan. A U-2 plane was used to collect a sample of upper atmosphere dust large enough for detailed analysis. Both tritium and Chinese plutonium were detected. In view of the colonel's firing information, it's fairly clear that the Chinese fired a missile armed with a hydrogen bomb warhead at Ul Chalan. The missile was somehow destroyed in midflight."

Karl was watching Gertrude as if he were afraid she would say something stupid. It seemed a shame to disappoint him. "Just a minute," interrupted Gertrude. "Plutonium is an element, it's all the same. How can you tell if it came from Red China?"

The scientist looked at her as if she were a dumb three-year-old. "Plutonium is an artificial element made by neutron absorption in nuclear reactors. The initial product is Pu^{239} which is fissionable, but it can absorb a neutron to make Pu^{240} which is not fissionable, but which absorbs neutrons to make Pu^{241} which is fissionable, et cetera. To make weapons-grade plutonium we change the fuel rods often, so the plutonium is mostly 239. To make electric power the fuel rods are rarely changed, and we have to bury the by-product plutonium. The Red Chinese have a modified gaseous diffusion process by which they upgrade plutonium from power reactors. They and they alone make weapons-grade plutonium containing 241 and 243."

The next speaker was a doctor: "If you will recall, the Vice-President visited mainland China last summer and gave a very elaborate BRK correlator to a Peking hospital. That hospital treats all of China's top officials. The BRK measures electrocardiogram and other heart-lung functions and correlates them with the patient's past history. It provides good early warning of heart failure, stroke and most other natural causes of death

which are sudden. The model the Vice-President gave the Chinese had one feature he didn't tell them about: it broadcasts all data into the power line. Our agent's receiver, three blocks from the hospital, has obtained complete medical information on all of China's leaders. In view of Chairman Mao's age and illness, the most powerful man in China is the new defense minister, Chan Si Ree. He appeared to be in perfect health when examined last month. The Chinese are trying to keep it a secret, but he died Sunday at noon GMT of an apparent heart attack."

These presentations of the available facts were followed by vigorous discussion. The Chief summed up the conclusions of the meeting: "There have been several interesting events, but there is no proof that these events are connected. If they are connected, they form a frightening pattern: war between Red China and an unknown power at Ul Chalan. The Chinese used both conventional forces and nuclear weapons. Both were easily defeated. In a single deft counterstroke China was robbed of her leadership and plunged into a power struggle which will take months, if not years, to settle. There was a war and the Chinese lost. All this is tentative; all we really know is that we need to investigate. Before you came to this meeting, I reviewed our available agents. Tibet has been back-burner for a long time. We have a sleeper not too far from Ul Chalan, but no actives we can use. We must send someone, and of the available people only one can even speak the language: Gertrude Eisenstein. Therefore I shall tell the President that it is the unanimous advice of this committee that Gertrude Eisenstein go immediately to Tibet and investigate."

II

The voice in Gertrude's earphones said, "Infrared shows a building to the north. It must be the monastery, so I am starting the count-down now: ten, nine, eight, seven . . ."

On seven Gertrude pulled the first lever. There was a smooth sliding noise as the charge of explosive slipped under her seat. ". . . Six, five, four, three . . ."

Gertrude pulled the second lever, firing the explosive bolts. The canopy shot away. ". . . Two, one, go!"

Gertrude pulled the third lever, firing the explosive charge under her seat. She felt an intense jolt as she was ejected from the jet plane. She had bailed out at forty thousand feet and six hundred miles per hour. Hitting thin air at six hundred miles per hour is a little like making a hundred-foot dive into ice water. There was an intense deceleration, and despite the supposedly perfect aerodynamic

balance of the ejection seat, she went into a spin. The bright moon and stars were flashing blurs in her sight. The spin slowed and Gertrude pulled the fourth lever, separating herself from the ejection seat. She tumbled free and assumed the normal skydiving position.

She was falling in total darkness; the ground below showed no lights, no hint of how far she had to fall. There was no choice but to hope the automatic release was accurate. If she panicked and pulled the manual release, she could die of exposure during the long fall. Her parachute should open five minutes after ejection, but it seemed she had been falling half the night. It was not pleasant to think of what would happen if the automatic was not properly set. It took considerable willpower to keep her hand off the manual release as time dragged on. There was a sudden snap and swish. CIA parachutes are designed to open without a loud and possibly betraying pop. The chute did not jerk Gertrude, but with a steadily increasing pull it slowed her fall to a gentle downward drift. Gertrude wished she could see: if she was drifting straight down, well and good, but if there was a ground wind her landing would be dangerous.

It was fortunate the ground Gertrude hit was fairly flat, for there was a strong ground wind. Gertrude lacked the skill needed to collapse her chute, and it dragged her along the rocky ground like a wild horse. She pulled furiously at the parachute disconnect lever, but nothing happened. In despair she pulled the manual release lever and was promptly disconnected from her chute. It was also a good thing that Gertrude had trusted the automatic release, since she had confused the levers for opening the parachute and for disconnecting from the parachute. Gertrude lay on the ground catching her breath and having unkind thoughts about the Air Force. Here she was a poor hard-working spy, and they had given her a bail-out system with six levers. There were, let's see, seven hundred and twenty different sequences in which one could pull the levers, one sequence which was extremely dangerous and seven hundred and nineteen which were instantly fatal.

Still, there was one good thing about the ejection system: it included a back-pack oxygen system. With a mean elevation of fourteen thousand feet, Tibet was justly called the roof of the world. Now it was time for Gertrude to find out if she could breathe here. When the Chief decided Gertrude should go to Tibet because she could speak the language, he had expected his subordinates to arrange such details as breathing. The best the CIA doctor could do was to teach Gertrude an adaption procedure which would protect her from

shock due to sudden change. Gertrude removed her oxygen mask and began the procedure. Her ugly body was quite strong, and Gertrude was confident it would meet these new demands.

Midway through the adaption procedure she began to feel some doubts. Perhaps the makeup man had been right after all. Gertrude and he had disagreed as to the best disguise. Gertrude held that the best was the least. Since she was stocky, and had brown eyes and black hair, all she needed to look like a native was skin coloring and a slight touch to make her cheekbones more prominent. The makeup man had insisted on making Gertrude into an old woman. That way her breathing trouble and weakness would be less conspicuous. At the time Gertrude had been insulted, now she was thankful.

Dawn came at these high altitudes suddenly, like thunder from the east. Gertrude gazed about at the desolate tundra, a vast, rocky, barren waste. Though bitter cold it was not frozen for lack of water. This was the Chang Tang. The lawless nomads who dwelt in this great flatland had never been subdued by the Dalai Lama's government nor by its Chinese Communist successor. It was strange that men could live in this hostile land, stranger still that they should fight over it. The air on the planet Mars was considerably thinner, but Mars was no colder or dryer than the Chang Tang.

A spy's first business is to avoid detection. Gertrude walked after her parachute, which had not blown far. As she wadded it between a pair of rocks, she decided this first part of the mission was probably a success. The Chinese radar network around Tibet was full of holes and outdated. It was not at all likely they had spotted her plane, which had the latest antiradar system. Her arrival might be betrayed by the ejection seat, but it was a mottled dull brown and would not be noticed from any distance. The only remaining problem was the oxygen pack, which she had planned to hide but would probably need. With a little work, Gertrude contrived to hide it under shapeless sheepskin robes. It was a little like hiding a large sign saying, "I am an American Spy, please shoot me" under her robes. Still, if the Chinese Communist troops she met did not suspect her, all would be well. If they did decide she was suspicious, they would probably not search her, but kill her out of hand.

Gertrude's local contact was in a monastery ten miles to the south. As Gertrude began her hike, she reviewed her possible cover stories. How could she reach her contact without creating suspicion, without attracting attention? Did she dare claim to be a blood relative? There

might be total lack of resemblance. All she knew about her contact was his location, his name, Jar Quinan, and his code word. To identify herself to him she was to say, "It is time for the rising of the moon." He would reply, "The poppy does not grow on the roof of the world." What business would plausibly bring an old woman to this remote monastery? It would be better if her business could be explained in a few words. Gertrude's Tibetan was not completely without accent. One scheme came to mind. Stagger up to the first monk she saw, gasp Jar Quinan's name and pretend to faint.

After three miles Gertrude paused and breathed oxygen for a few minutes. She didn't feel any need for the oxygen but the doctor had recommended this procedure. She hiked another three miles, thinking hard but finding no satisfactory plan. Pretending to faint might work, but it lacked style. Suddenly she spotted the monastery. There was a mountain four or five miles to the south-southwest. Halfway up the mountain on the side of a sheer cliff stood a large black stone building. The spot was so inaccessible that an eagle would have had trouble building a nest there. How the monks built the monastery was a mystery; how Gertrude was to get there was a greater mystery.

It was time to use oxygen again, but the danger of being seen was

too great. She walked on, fumbling in her robes for her binoculars. The silly things didn't want to focus; Gertrude's fingers seemed to be thumbs. At last the image became sharp, but she had trouble holding the binoculars steady. Gertrude sensed that she was becoming clumsy, uncoordinated, but this triggered no sense of alarm. There appeared to be a well at the foot of the mountain. Gertrude returned the glasses to their hiding place in her robes, nearly dropping them in the process. She walked on toward the well. With each step her stride became more irregular, her balance more uncertain. Fog was slowly closing in on her brain. There was an important problem she must solve, something to do with her business at the monastery, but what? She reeled, staggering toward the well. There were three figures in black around the well. As Gertrude approached them she gasped, "Please, Jar Quinan," then she fell and all was blackness.

III

Gertrude awoke, cold and stiff. Her eyes opened and she saw she was resting in bed, but it was a bed as hard and cold as the mountain rock. She looked up and saw a monk in black robes. He was tall, lean as a wolf and as hard. His bald, shaven head seemed to have been stretched to half again the normal length. His face seemed to be carved from flint; the dark brown eyes were strong and cold. "How are you?" he asked in English.

This was an old trick. Gertrude gave no sign that she understood, mumbling in Tibetan, "Please, Jar Quinan."

"I am Jar Quinan, chief abbot of this monastery," the other replied, "and you are a CIA agent. Your password is, 'Now is the time of the rising of the moon'; my reply, 'The poppy does not grow on the roof of the world'. Now will you explain why the department sent me an agent who can't breathe the air instead of my back pay for the last five years?"

"I thought you were a sleeper, an agent paid to do nothing except await orders."

Jar Quinan snorted angrily. "I've been fighting the Chinese oppressors all my life. Five years ago the department put me on 'inactive status'. I kept on fighting, but they stopped paying me."

It was clear to Gertrude that winning the trust and cooperation of this man would be a problem. "Why do you fight?" she asked. Jar Quinan looked at her in amazement that anyone should ask such a question. "Please explain to me," Gertrude continued. "I'm from far away. I know what has happened, but I have no feel for your people. I don't know why you fight."

Jar Quinan was an angry man. As Gertrude expected, he wel-

comed this opportunity to explain his rage to an outsider. "Those foreign devils are destroying my nation and my people. The Dalai Lama forbade foreigners and their evil technology from entering Tibet, but the Chinese force the accursed new ways upon our people. They bring medicines to heal the sick, but it is contact with foreigners which brought the diseases in the first place. They disturb the spirits of the earth by building roads, that their tanks may freely range the countryside and crush the people. They open mines and build industry and thus poison the rivers and the land. Perhaps the worst is their program to reduce infant mortality. This is a fearfully cruel fraud, for the earth cannot yield enough food for all these extra mouths."

Gertrude was interested by this catalog of Chinese sins, since every sin was a virtuous act by Western standards, while the acts of oppression and murder which angered the West were ignored by Jar Quinan. The dilemma of saving babies was typical. Tibet was the only Asian nation which was not overpopulated and could feed her people well. Decreasing the infant mortality rate would destroy this balance. Gertrude was sure Jar Quinan spoke for his countrymen: they hated the Chinese not because they were cruel oppressors, but because with good intentions they were destroying an ancient cul-

ture that the Tibetans cherished.

"But don't you want progress?"

"That is the great mistake of the West. You spend your lives seeking material things because you fail to see that true progress is spiritual."

"But we have to worry about money, everything is so expensive."

"Nonsense, we are born without asking or paying and likewise we die. Thus the soul moves through wheels of existence, money a useless hindrance."

"Dying isn't free, not with modern funeral costs."

"Ah yes, I have read of this great folly. You spend your lives struggling to amass property, then much of the wealth is squandered on an elaborate funeral. You are not content to sleep on soft beds all your lives, you must have silk cushions in your coffins."

"What would you have us do?"

"Does not your religion, like ours, teach that the spirit is all, the body but clay?"

"Yes."

"Then why not practice Ja-Tor as we do?" When Gertrude looked blank, he explained. "Ja-Tor is the feeding of the birds. We put the body out for the vultures to eat."

For a moment Gertrude had a horrible vision: the cemetery beside the Long Island Expressway replaced by a park filled with hideous vultures. "I don't think that would work in America because of the climate. What about other spiritual values, such as justice? We have a fine court system."

"I have read of your courts. They are so busy hearing endless appeals that justice is denied by delay."

"Surely you would not deny the right to appeal?"

"No, but here in Tibet appeals are nearly always well founded, since anyone impeding justice with an ill-founded appeal receives double the original penalty."

Gertrude was well pleased with this conversation. Having gotten the abbot to denounce Western materialism, he probably wouldn't complain about his back pay in the near future. She continued the indirect flattery of letting Jar Quinan use her to prove his prejudices. Each time this bitter and embattled man proved the superiority of Tibetan culture, he became more friendly. Soon Gertrude decided to switch to direct flattery. "I'd like to know what you have been doing lately. Washington has no clear reports, but it's obvious you have done something very important."

Jar Quinan's hard face relaxed into a half smile. "I have to share the credit with Go Don Hoy. He's one of the Viet Cong retreads you CIA people sent up here to teach us guerrilla warfare. Six months ago we got a large shipment of American rifles." Gertrude showed no surprise at this last statement, but her mind raced. Three years ago, in line with State Department

policy to improve relations with Red China, the CIA had stopped shipping American arms to Tibetan rebels. Since then the CIA had sent the rebels only Russian arms, pretending to be Russians when they did it. Apparently that was a game two could play. Jar Quinan continued, "Well, we had arms, but how could we strike a really effective blow against the Chinese? Finally we decided to use the trail to Ul Chalan."

"Wait a minute. How can there be a trail to Ul Chalan? I thought it had never been visited."

"No, on the southeast side there is a fine broad trail an army of tanks can climb. The way to Ul Chalan is easy and many have gone there."

"What did they find?"

"That would be hard to say since none of them returned. Of course, this was the basis of our plan. The chief of the large nomad tribe was mad with hate for the Chinese since they put his son to Ja-Tor alive. The chief, like many of my people, prefers the traditional weapons, but we persuaded him that we must fight fire with fire. His people made a false trail so it appeared they were camped on top of Ul Chalan, then the chief, Go Don, and I led the tribesmen in the ambush and massacre of three Chinese patrols. In each case we left a few survivors to report that we rode off toward Ul Chalan. The Chinese quickly gathered enough men to destroy a nomad tribe and attacked Ul Chalan. When those men didn't return, they sent another force twice as big, then another force twice as big again. Finally they sent a full division of tanks, but these men died on the slope as they approached Ul Chalan."

"After that," exclaimed Gertrude, "the Chinese fired a nuclear missile which was destroyed in midflight, then Chan Si Ree died of an apparent heart attack and China was plunged into confusion. Singlehanded you have won a great victory."

"True, but Tibet is still under the Chinese thumb."

"Perhaps I can help. There is power at Ul Chalan, enough to free Tibet, if we can make a bargain with Sothatalos."

Jar Quinan frowned thoughtfully. "Of course, I thought of that. It's a desperate gamble, but what is my life against the saving of this nation? Perhaps I shall go. There appears to be a narrow trail on the southwest side. To my knowledge no one has tried that route, so it might work."

"I have satellite photos. Can you find this trail?"

Jar Quinan tried to conceal his awe at how well the eye in the sky could see. The trail was easily found both in the optical and radar photos. The Tibetan monk rapidly became enthusiastic for the expedition. "Tell me, these strange shapes

within Ul Chalan, what could they be?" he asked.

"They must be shadows, since they show only in the optical, not the radar."

"But there's nothing to cast shadows. I think your radar is blind to whatever dwells in Ul Chalan."

Gertrude smiled. "These are mysteries we shall solve only by going to Ul Chalan."

The monk looked at Gertrude, his hard face softened slightly. "You're a very brave fool. Even if I were willing to take a woman on such a dangerous mission, you could not come. Your oxygen tanks are nearly empty. You have trouble breathing here at fourteen thousand feet. Ul Chalan is at twenty-four thousand feet and you would quickly die."

Gertrude started to argue but there was a disturbance outside and Jar Quinan rushed off, his robes flapping like the wings of a great black eagle. Gertrude swiftly hid the photos and resumed her pose as a sick old woman. This done, she had a moment's peace to think about her problems. She needed oxygen, transportation to the trail and help climbing it to Ul Chalan. The monk could help her climb but he could not supply oxygen, and the best transportation he could offer would be a mule. Gertrude did not fancy the prospect of a hundred-mile mule-back ride. But she was used to this kind of problem. The department always tried to make her carry a short ton of equipment and gadgets, but Gertrude was convinced it was safer to trust her wits and on rare occasions her old forty-five. To her surprise, Gertrude found she had a second set of problems, problems of ethics and conscience. She had spoken to Jar Quinan of freeing Tibet, but it was not present CIA policy to offend the Chinese. Worse, the department was sensitive to criticisms that it helped reactionaries and Jar Quinan was quite literally fighting to keep the Dark Ages. All this seemed to say that the monk should be used as a means to an end but not helped. Gertrude could not accept this. She liked Jar, he was brave, intelligent and seemed to Gertrude to possess a tragic nobility. There might be hell to pay for it, but she would keep faith with this man.

Jar burst back into the room. "We are betrayed. I didn't believe it possible, but the Chinese have an informer in the monastery."

An instant later a major of the Chinese People's Army strode into the room. He was accompanied by four soldiers with machine guns. The major was short, stocky, and appeared to have no neck. Rather, his round head seemed to be welded directly onto his squat powerful body. His face appeared to have been hammered in bronze by an unskilled craftsman.

Gertrude had no desire to be

questioned by the Chinese and was doing her best imitation of pneumonia, coughing, sneezing and delirious mumbling. She could not produce a fever at will, but she could and did break into a cold sweat.

The major glanced at Gertrude and turned to Jar Quinan. "Now, Abbot, we shall have a reckoning. Who is this woman and what is she doing in your monastery?"

The monk bowed politely and replied, "Most worthy Major Tong, I am not sure but I think she is my wife."

"What! Explain yourself, dog. Monks have no wives."

"My order is of the Red Hats, not the Yellow Hats. Though few do marry, it is permitted. In my case when I was three, I and my five brothers were wed to a woman in order that an inheritance might not be divided. Only my elder three brothers actually lived with the woman, I and the other two went our own ways. Recently word came that the last of my elder brothers was dead, so I was not unduly surprised when this woman, who appears to be my wife, arrived at the monastery."

Gertrude had to admire Jar's technique. The lie was skillful. Since the major with his obvious contempt for Tibetan culture wished to remain ignorant of their peculiar ways, Jar's story fit the facts and took advantage of this weakness. Now, Gertrude decided, was the opportune moment. In the midst of her mumblings she said in a barely intelligible voice, "Sothatalos, Sothatalos."

The major leaped to Gertrude's bedside. "I was right," he shouted. "This woman is from Ul Chalan. I suspected something like this when I was informed that she came here from the north. There is nothing to the north except Ul Chalan."

Jar Quinan started to deny this, but Gertrude mumbled, "Magic bottle, escape, magic bottle." Her hand fumbled toward something hidden in the bedding.

Major Tong grabbed and pulled it forth. His eyes bugged when he saw the object, a U.S. Air Force oxygen cylinder. "I knew the Americans were behind this devilry, and now I have proof. No doubt this 'wife' of yours went to Ul Chalan to rob the dead, was captured, and somehow escaped. She knows the secret of that dread place."

"Believe what you like," replied the monk. "The only certainty is that the woman is dying. If you wish to stay here and listen to her ravings, we shall make you comfortable."

The major glared at the monk. He wanted to angrily reject this offer but could think of no alternative. Gertrude moaned, "Trail, hidden trail southwest side of Ul Chalan, way through the burning grass." After this she mumbled the

names of several Tibetan devils, then lay silent and apparently unconscious.

The major's wide face split from ear to ear with a grin of triumph. "This woman can guide me safely to Ul Chalan. Pick her up, we leave at once."

"Of course, this unworthy abbot is honored to accompany the estimable major wherever he wishes, but may I point out, if you wish to kill my wife there are more convenient ways than carrying her up a mountain. She is dying of pneumonia. Sacred herbs have greatly reduced her fever, but the demon which paralyzes her breathing will not yield to my exorcism. Thin air will certainly kill her."

The major disdained to reply, instead he took a walkie-talkie from one of his men and gave crisp orders. "This is Major Tong. Load all available oxygen cylinders into the ambulance and come to the monastery at once."

Gertrude lay in her bed, well satisfied with the way she had managed events. Now she would go to Ul Chalan riding in a comfortable ambulance instead of on a mule. Major Tong would supply the needed oxygen and his men would carry her up the trail. Gertrude thought it was generally better practice to accept favors from one's enemies rather than one's friends. The former, after all, are seldom in a position to ask the return of the favor.

IV

The trip to Ul Chalan started with a disaster. Major Tong had brought forty men with him to the monastery, while another ten arrived with the ambulance. Gertrude was resting in the ambulance, while Major Tong checked the oxygen cylinders and other equipment. There was a strange whistling sound from the sky and suddenly the guard in the ambulance door screamed and fell writhing beside Gertrude. An arrow projected from his back. Gertrude could not see what was happening outside the ambulance but she could hear. The sky was filled by a whistling chorus, all around the ambulance savage, snarling growls resounded. Men screamed in anguish and death and machine guns barked in their staccato voices. Gertrude lay motionless until the second guard left the ambulance. Only then did she risk looking out of the window.

The scene outside could have been an artist's vision of hell. The Chinese soldiers were being overwhelmed by furious canine monsters. Gertrude had heard of the Tibetan mastiff but she was astounded at the sight of the beasts, large as shetland ponies, tearing men to shreds with their huge jaws. Gertrude saw one man picked up and shaken by a mastiff, as a terrier shakes a rat. There was a crisp snap as the man's neck broke. In this close-quarter combat the soldiers could not use their machine guns effectively, still if one of them could stand in a good vantage point he could wreak havoc on the attacking dogs. Many tried to do this, but as soon as they exposed themselves, arrows whistled from the sky, turning them into pincushions. Gertrude seldom saw an archer; it appeared that much of the time they were firing blind, guided only by sound. The accuracy was disturbingly good, and a dog was never hit. In a flash of insight Gertrude realized that this was a coordinated attack: the dogs' barking guided the hidden archers, the whistling warned the dogs to avoid the arrows.

At her side Jar Quinan purred, "The chief still prefers the traditional weapons, especially dogs and whistling arrows. There are occasions when they can be effective."

The ambulance door crashed open and a soldier fell through. His throat was torn out and his heart was pierced by an arrow. The corpse was followed by a huge dog. The beast was jet black with bright brown patches above the eyes. The bright eyes looked around the ambulance with clear intelligence. It sniffed Jar and appeared to decide he was a friend. Gertrude wondered if her CIA disguise would fool the dog's nose. It did not. The dog bared its great fangs and lunged at Gertrude. The sheepskin robes interfered with her fast draw. The black monster slammed her

down before her gun was half out. The powerful jaws shot at her throat, then the dog was slammed aside. Jar Quinan and the dog were a tangled struggling mass on the floor. Gertrude pulled free and leveled her gun. She could not find a clear shot, could not be sure what was black dog, what black-robed priest. Suddenly Jar's hands made a rapid complex motion, and the dog went limp. He pushed the corpse aside and rose, scratched and bruised but not seriously injured. He smiled at Gertrude and said, "The world has learned the Japanese jujitsu and the Korean karate but not the Tibetan art. Now it is best you get back to dying of pneumonia."

As Jar started to close the ambulance door, he was surprised to see two Chinese tanks approaching the battlefield. The tanks' cannons began lobbing shells into the archers' hiding places while their machine guns cut down men and dogs without discrimination.

Major Tong and four soldiers came running toward the ambulance. Two soldiers raced to the driver's section; Tong and the other two leaped into the back. The major had ordered all available oxygen cylinders and this included one large cylinder far too heavy to be useful to climbers. Tong grabbed the large cylinder, twisted the protective cap off so that the cylinder valve was exposed. With a surprising display of strength he whipped the cylinder above his head and threw it at the nearer tank. It flew through the air, struck the ground, and rolled bouncing toward the tank. Close to the tank the valve snapped off and the high-pressure gas jetted out. The cylinder spun about and slammed into the tank. For a moment it appeared Major Tong might as well have thrown a large rock. Tong's eyes were focused on the tank's left tread. Something there was smoking due to overheating. In a pure oxygen atmosphere the smoldering was transformed into incandescent fire which spread rapidly. There was a muffled roar as the engine exploded. The tank was wrapped in blinding white light as gasoline, grease, rubber and even the steel itself burst into furious combustion. The earth shook and the sky was shattered as the tank's shells exploded in a single thunderous blast.

While this happened, neither the ambulance driver nor the men in the other tank had been idle. The ambulance had shot forward and sped out of range of the tank's machine guns. Only a few bullets from the first burst passed through the ambulance body. The cannon was a different problem. Gertrude was thrown from her bed as the ambulance swerved sharply right. A second later a concussion struck the left side of the ambulance like a giant fist. The second shell was a clean miss and the third shell fell

short. A moment later Major Tong signaled the driver to stop zigzagging since they were beyond the accurate range of the cannon. The tank gunner did not agree and fired several more shells, though none came close.

There followed a deadly version ot the tortoise and hare race. The tank could move at its maximum speed over the roughest ground. The ambulance, though far swifter, was in continual danger of being disabled by breaking an axle or blowing a tire. Several times the tank driver gained ground by taking short cuts the ambulance dared not use. It never came within accurate cannon range, but it came close enough to rain shells in the ambulance's vicinity. The ambulance driver was prudent, never allowed this tactic to force him into blind flight. Each time he pulled slowly out of range, driving as fast as the terrain permitted.

Gertrude was strapped in bed, being thrown back and forth as the ambulance jolted madly on. She listened to the thunderstorm of cannon shells outside and reflected. She had arranged this ride to avoid the discomforts of a mule-back ride. The ambulance shook as a shell exploded a few yards to the right. Possibly, thought Gertrude, the mule would have been better.

Major Tong growled at Jar Quinan, "Revive your wife any way you can. I must have clear directions to the hidden trail to Ul Chalan or that tank will catch us."

Gertrude had no idea where they were or where they were going. Therefore she gave directions largely by mumbling unintelligibly. Jar Quinan knelt beside her occasionally asking questions. After a little he rose and gave Major Tong the desired directions.

By the time they reached the trail, they had gained perhaps half an hour on the tank. Major Tong barked crisp orders, equipment was quickly assembled, and the expedition started up the trail. Major Tong and Jar Quinan took the lead while the four soldiers carried Gertrude in a stretcher. All wore oxygen masks. They were half a mile along the winding trail when they heard the familiar roar of the cannon. An instant later the ambulance erupted into flames and flying metal fragments.

Jar Quinan turned to Major Tong and, measuring his words carefully, asked, "May this unworthy one know the cause of these strange events?"

An angry snarl rose in Tong's throat, but fatigue and despair smothered it. "Why not? After Chan Si Ree died, some of our leaders accused other leaders of his murder and China was plunged into civil war."

"This is heavy news," replied the monk. "It means we of Tibet will be denied Chinese guidance."

"You need no longer lie," snarled the major. "I know you're

a rebel. Now you have won."

The monk faced the major and spoke with clear disdain. "If you were worthy of your ancestors, you would know that victory can be as heavy a burden as defeat."

The major cursed, drew his pistol, and leveled it at Jar Quinan. The monk looked into the barrel of the gun with vast indifference. Had he shown the slightest fear, Tong would have slain him. As it was, the moment of tension passed. Tong swore under his breath and put the pistol away.

The monk walked up the trail in silence. His face grew darker. He would not speak when spoken to. This brooding silence continued until the climb was nearly complete. The trail widened into a broad, flat area. Ahead the mountain rose to form a high wall. The trail cut straight through this wall, so that they were approaching a natural gateway, the gateway to Ul Chalan. Natural? When Gertrude considered the matter, neither the trail nor gateway appeared to be accidents of nature. Rather they appeared to be artificial and very ancient.

Major Tong ordered the soldiers to put Gertrude down. He started to give Jar Quinan an order but the monk interrupted him. "Why should I take orders from a coward who deserts his own men under fire?" With this he slapped the major's face.

Tong's hands expressed his fury. Blow after blow struck the monk, but he made no effort to defend himself. When he fell senseless at Tong's feet, the major drew his pistol. It popped out of his hand when Gertrude tackled him. They fell in a tangle and came up facing each other. Tong's face showed brief surprise, then battle joy. His powerful hand flashed toward Gertrude in an expert karate chop. Gertrude evaded this while delivering a hard right cross to Tong's chin. This was followed by a groin kick and a fine rabbit punch.

As Tong dropped, Gertrude dropped with him, using his body as a shield while she drew her forty-five. A pistol is a poor match for four machine guns, but only one of the soldiers showed fight. Gertrude's first shot struck him in the shoulder. He staggered, dropped the gun and ran through the gateway into Ul Chalan. Climbing to Ul Chalan, whence none had returned, had strained the courage of the other three. When a dying woman was transformed into a fighting demon, they fled back down the trail.

Gertrude examined Jar Quinan. His hard body had absorbed the beating without serious injury. She slapped his face not too gently, and as he regained consciousness she said, "That was extremely foolish. You forced Major Tong to try to kill you. Why?"

"I always wanted to slap that

pig's face," replied the monk. "With Tibet freed, my own life no longer seemed important."

"Again why?"

"I have violated the eightfold way with countless acts of violence. Even though I am a priest, when need arose I butchered animals for meat, even practiced the blacksmith's trade. These are the acts of the untouchables, whose children cannot even be priests. I fought fire with fire, a foreign army with foreign weapons and ways."

"But the victory was yours. This you achieved in a single stroke."

"Know you not the story of Moses, that he delivered his people but he himself could not enter the promised land. So it is with me. I am too tainted with foreign ways to live in the ancient land of my ancestors. But hold, why am I still alive?" The monk's eyes fell on Tong's unconscious form, then the soldier's blood and the machine gun he had dropped. "The place of women in Tibet is lowly, for they are weak. Major Tong is powerful. Did you, a frail woman, overcome this brute in hand-to-hand combat, then drive off four well-armed soldiers in a gun fight?"

"Yes, the major was a sucker for a right cross."

"That is another thing an orthodox Tibetan should not know."

Gertrude thought she now understood her comrade: he had a compulsive drive to achieve. Given a goal he worked tirelessly, doing miracles; but the goal achieved, self-doubts and self-recriminations assailed him and he fell apart.

Major Tong groaned and started to rise. Gertrude turned to face him. His eyes cleared and, seeing Gertrude, he started to charge. She leveled her forty-five and barked, "Stand still Tong, or I'll blow your brains out." Since the gun was aimed at Major Tong's lower abdomen, the threat was clearly insulting.

Tong stopped and laughed. "Truly in view of the way you two tricked me, that's where my brains are. Now shoot me and be done with it."

"Why did you come to Ul Chalan?"

"I knew the starting of civil war in China was connected with Ul Chalan. It was my forlorn hope to learn some secret here, something that would help bring the civil war to a compromise settlement."

"Jar, I think we should help Major Tong. After all, Tibet's independence is won, but it is not secured. If the Chinese civil war ends by the victory of either side, the victors will soon enslave Tibet again. If the war ends by compromise, Tibet's independence is assured, since neither side would agree to let the other rule her."

Jar frowned in thought. "Help a man who has been a hated enemy for years? Yet your words ring true; new circumstances demand

new goals. So be it. Here, Tong, you are probably best trained to use this." Jar Quinan picked up the machine gun and tossed it to the major.

As the gun flew toward the outstretched hands of the Chinese, Gertrude had second thoughts. She had proposed this alliance to snap Jar out of his depression. He had grabbed it as a drowning man grabs a rope, but was the alliance a good idea?

Tong's fingers closed about the machine gun, his face split in a wide grin. "Now that you have wisely elected me to command this expedition, we shall go forward as true and loyal comrades."

Good idea or not it was done. Gertrude decided that, on balance, Tong would be an asset. Subtle treachery was not part of his character, and his arrogance could be managed. The real problem was courage; Tong possessed great physical courage, but the mystery they faced might be beyond the limits of his orthodox military mind.

The three adventurers turned toward the gateway to Ul Chalan.

V

They stepped through the gateway, armed and alert. They were prepared for danger, but not beauty. Tong gasped and pointed. Ahead of them lay a broad, flat plain and rising from that plain, perhaps ten miles distant, there was a gleaming city. The skyline they beheld was that of a fairyland city, a city which could not exist in the real world. The towers, spires and arches rose and flowered in cheerful indifference to the force of gravity. Gertrude was reminded of some of the mobiles she had seen at the Museum of Modern Art. Not that the buildings moved, but many stood on such slender supports that they seemed to float. To the right of the buildings stood a forest. A forest not of trees but of shining pillars of multicolored light. The pillars were all tall and slender, and wrought with complex spirals.

"Well," snarled Tong, "now we know two things about Sothatalos, or whoever lives at Ul Chalan."

"What?" asked Gertrude.

"They love beauty but are unfriendly to trespassers." The major's eyes passed quickly over Gertrude's face and unshapely body. "Certainly none of us will charm them with our good looks."

Gertrude had long ago resigned herself to the fact that no man would ever look on her with pleasure or desire. To her the major's reference to her ugliness was a simple statement of fact, not insulting and probably not intended to be insulting. However, Jar Quinan bristled at the remark. In an angry tone he said, "Perhaps they will be more discerning than you."

Gertrude drew out her binoculars and examined the city and the for-

est. There was no sign of life or motion. The binoculars told her that the pillars of the forest were made of crystal and that there was one pillar her unaided eye had missed because it was dull, not refracting light as did the others.

The terrain was such that, although they could see the spires in the distance, they could not see the ground ten yards ahead. When they advanced they got two unpleasant surprises. The first was that the ground ahead wasn't there; instead there was a deep chasm. Its sides were a smooth straight drop of nearly a hundred feet, and the chasm was slightly too wide to jump. The second surprise was the soldier Gertrude had wounded. The air above the chasm had an odd shimmer so that objects on the other side were blurred. Still, on the other side was what very much appeared to be the soldier, lying motionless on the ground.

"If a wounded man can jump it, so can we," roared the Chinese.

"No," replied Gertrude. "Since we cannot, neither did he." She sensed a mystery here and for want of a better experiment she decided to toss a rock across the chasm. She picked up a rock and got another unpleasant surprise: she could not let go of it. Her hand was frozen to the rock.

Major Tong laughed. "A rookie mistake. There you are, all snug in your sheepskin. There's no wind, so your body loses little heat and you feel comfortable. You forgot that it's cold here." The major spat. His spit cracked as it hit the ground, hard ice. "Very cold."

The monk glared at the major as he helped Gertrude warm the rock and free her hand. Gertrude was angry so she threw the rock, hard. Halfway across the chasm it slowed to a stop, then shot back, striking Major Tong in the stomach. Gertrude grinned at the slightly injured and very surprised major. "Sorry about that."

Gertrude kicked a small rock over the edge of the chasm. Instead of dropping straight to the bottom, it curved back and bounced several times against the vertical side before stopping halfway down. Jar screamed in horror as Gertrude stepped over the edge. She did not fall but cheerfully stood on the side and began to walk down the chasm wall. Jar followed her. As he stepped over the edge, the world seemed to shift. The vertical wall became a gentle slope, easy to climb down.

Gertrude cheerfully expected the opposite chasm wall would, when approached, also miraculously become a gentle slope. It did become a slope, but a steep one; worse, Gertrude found she was growing heavier. With each step her weight increased and her muscles were more strained to lift herself the next step. She was strong enough to climb bearing half again her weight, but it was disturbing. What

could she expect next? The little she could remember of her college physics told her nothing except that all this was impossible.

By the time she approached the top of the chasm, she had formed a vague theory. She was very careful of her balance as she eased her body up out of the chasm. Then, standing erect, she jumped ten feet straight up and slowly floated down. She was right; gravity on this side was only a third of normal.

Major Tong shouted, "What is this?"

The major was puzzled to the point of angry frustration. Jar Quinan smiled at him. "Surely it is obvious. We saw before us a city whose buildings are too weak to bear their normal weight. Naturally the city is in an area where weight is less than normal."

"Then why the chasm? Why did that stone Gertrude threw come back?" demanded the major.

"Clearly an interface phenomenon," replied Gertrude. "This is a localized gravity warp, and the potential energy has to be adjusted to match Earth's gravity potential. That requires odd fields at the edges." Gertrude went on to spout quite a bit of scientific nonsense until the major smiled and said he understood it.

"Unfortunately, we have another mystery to solve." Jar Quinan pointed to what had appeared to be the wounded soldier. It was only his uniform and equipment. The clothes were all arranged inside each other as if a man were wearing them, but the body was gone.

"Why would whoever killed him arrange his clothes thus?" Tong swore under his breath as he examined the remains. "The body is gone, the belt, boot, laces, pack straps, and every other bit of leather are gone. Here is the bullet hole where you shot him, but nowhere in his clothes are there bloodstains." He opened the soldier's pack, lifted a can, and examined it carefully. "This can of meat shows no sign of tampering, but—" he pulled it open "—it's empty. Tell me, monk, have you an obvious explanation for this."

"Certainly, this poor man and all the animal matter he carried were eaten by a demon. I realize you Chinese don't believe in Tibetan demons, but it ate him anyway."

Tong's eyes flashed but he replied in a calm voice, "You may not be far from the truth. Before the dwellers in Ul Chalan and their powers we are but three ants. To us such powerful beings must be demons. If they notice us, it will be to step on us."

Jar opened the other supplies from the soldier's pack. "Let's eat. You'll feel better with a full stomach."

Tong sat down and snapped, "In all my years in the army, that's the first good idea to come from a chaplain."

Jar hit a chocolate bar with his pistol butt. It broke like plate glass. "Here, Gertrude, put small pieces into your mouth and let them melt."

When they finished the frigid meal, Jar announced, "As a native Tibetan I should have little trouble breathing at this altitude without this oxygen tank. For me oxygen is a luxury, but not for Gertrude. Since the supply is limited, I'm going to stop using it and I suggest, Major, that you use your oxygen tank sparingly." Suiting his actions to his words, he turned off the tank valve and removed the mask. He breathed the air of Ul Chalan and with a puzzled expression turned blue and keeled over. Gertrude caught him, reopened the valve and put the mask back on Jar's face. His breathing did not resume, and Gertrude gave mouth-to-mouth resuscitation. This was awkward with the oxygen masks, but in a moment Jar revived. As his eyes opened, Gertrude hastily removed her face from his.

"What happened to me?"

Tong laughed. "This mystery I can explain. Look." He struck a match. There was a tiny brief flash, but it refused to ignite. "The atmosphere here has no oxygen."

"In that case we had best do what we can rapidly, for we have only a few hours of breathing left. Major, if you will bring the soldier's oxygen tank." Gertrude rose and began to march to the city.

The plain through which they walked had appeared completely barren from a distance. The granite rock of the plateau was covered in places with drifts of yellow and red sand. In other places there were greenish brown discolorations on the naked rock. On closer examination the discolorations proved to be plants. At first glance Gertrude thought they were lichens such as grew in the Chang Tang, but there was no real resemblance. The plants, though ugly in overall shape, were beautiful in fine detail, lovely intricate lace work.

Tong touched the plant. "This thing is not frozen." His knife flashed, he cut one of the plant's stems, and got a drop of its sap on his finger.

"Wait!" said the monk. "Is it wise to taste this alien thing?"

"Bah, you Tibetans are afraid of everything foreign." Tong touched the sap to his tongue. "The plant's not frozen because its sap is good vodka." Tong tried to uproot the plant but could not. Its roots were not in cracks in the rock, they were sunk directly into the unbroken granite.

They hastened toward the city. Near the city the ground was very flat and three-foot cubes of rock were arranged in neat rows. The plants growing on the rock cubes were much larger and fatter than those they had seen before. Tong snarled, "This farm must yield enough vodka to keep an army

drunk, but what do they eat?"

The attack came without warning. Before Gertrude could raise her forty-five, the thing was upon her. It was black, had a broad, thin, flat body like a vast opera cloak. Gertrude struggled furiously to level her gun, but could not, for the monster held her tightly in its tentacles. The thing's nightmare face bent slowly toward Gertrude's face, the three eyes glowing with an avid hunger.

Tong's machine gun barked in its staccato voice. The thing's body was torn full of holes but it did not appear significantly harmed. The monk drew his knife and grappled with the monster, its tentacles enwrapped him, but he managed to cut several tentacles including the one which held Gertrude's gun hand. She raised her hand toward the thing's head. It opened its loathsome mouth and swallowed Gertrude's hand, gun and all. *Now,* thought Gertrude, *we'll see how this thing likes contact wounds.* The forty-five in her hand bucked again and again. The demon's neck and the back of its head exploded. With a violent spasm it threw Jar and Gertrude from itself. The monster stood for a moment, sunlight streaming through numerous bullet holes in its body, its head was hanging by shreds of a neck and several of its tentacles were lying on the ground wiggling like headless snakes. The eyes blazed with hatred and it charged at the adventurers. Tong heaved up one of the stone cubes. Even in this low gravity it was a great weight and its inertia was not decreased. Nevertheless, Tong raised the block above his head and with all the power of his mighty body slammed the block down into the monster. Most of its body was crushed to a pulp. As they watched in horrified fascination, the monster began to wiggle, not out from under the block, but out through it. Although it had the power to penetrate solid matter, its wounds were mortal. It gave no death cry, no sound of any sort, but Gertrude felt a sudden wave of fear and anguish wash over her mind, then the monster was motionless and limp. It had died halfway in and halfway out of the granite block. Whatever power allowed the thing to penetrate the block did not end suddenly with its death. Instead the thing's body was slowly squeezed out and the block returned to its normal condition.

Tong's face showed fear, but because he would not admit being frightened to himself or others, he shouted in rage: "What was that cursed thing?"

Gertrude pointed to the sky. "The question is what are they?" Above them black shapes flashed across the sky. It appeared the demon's death had attracted others.

"As I said," replied the monk, "they are demons. I have seen them several times before."

"When, where?"

"When I fast in my visions. I must prepare for them." With that the monk sat down and spoke no more. His eyes were glazed and focused straight ahead at infinity.

The black forms overhead were flying much lower now. Tong emptied the machine gun at them with no effect. The cat and mouse game continued for a moment, then the black monsters dropped on the adventurers. Three grabbed Gertrude. She was wrapped helpless in their tentacles, jolted back and forth as the monsters fought among themselves for the right to eat her. Tong's bull strength allowed him to twist and turn in the monsters' grasp, tearing dreadful wounds in their bodies with his knife but never striking a vital spot.

Jar Quinan sat motionless while all this occurred, his eyes blank. The black demons crowded around him but did not touch him. Now his eyes focused and he rose. His mouth opened and he spoke in a dreadful language which human ears were never meant to hear. His voice was an echo of madness, to hear was to stand on the edge of insanity. Wave after wave of fear swept over Gertrude, a pounding storm of terror.

The next thing Gertrude realized she was lying on the ground, Jar bending solicitously over her. "Are you all right?" he queried, more than a little fear in his voice.

"Oh yes, but what happened? And where are those monsters?"

"I told you, they were demons. I performed an exorcism and they departed."

Tong heard this and moaned, "Better you had let them eat me. As an enemy you were very dangerous, Jar Quinan, but as a friend you are a disaster."

"How so?"

"If we live I shall have to write a report, including such details as a member of my command accurately scouted the area by fasting till he had hunger visions, and that he saved us from mythological demons with his magic. In the Chinese People's Army such a report is good for a firing squad."

Jar smiled. "Worry about your report after we investigate yon city."

Tong's mood did not improve when they entered the city. They kept to cover, slipping into the city as inconspicuously as possible. The unspoken plan was to observe the city-dwellers before revealing themselves. They sneaked around the buildings, through narrow alleys and came to a broad street. They peered up and down the street, then Tong strode to the middle of the street and bellowed, "By Chairman Mao's glorious intestines, where is everybody?" His words echoed and vanished into the empty stillness of the city. He turned to his companions. "This makes no sense. Why should a brand-new city be deserted?"

"How do you know the city is not ancient?" asked the monk.

"Look at the buildings, shiny metal, no rust, corrosion or wear."

"In this atmosphere metal would stay bright for a million years. The only thing which would cause wear is windblown sand. Since the rocks on the plain show no weathering I think there is little or no wind in Ul Chalan."

"People are not all that's missing," said Gertrude. "Where are the utilities, electricity, water, sewage?"

"Doubtless buried," rumbled Tong.

"But some of these buildings are practically hanging in midair. How could they be serviced?"

"Hm-m-m, now that you mention the problem, these streets are wrong. They give the impression of being laid out merely for artistic spacing of the buildings. Anyone driving a wheeled vehicle would have an awkward time."

"Perhaps they always flew."

"But the layout is bad for that too."

"Comrades," interrupted Jar Quinan, "there is a more important omission. I see no doors by which we may enter the buildings."

They moved on, searching. No doors were found but Gertrude noticed a window twenty-some feet above their heads. Jar sprang into the air and caught an ornamental projection on the side. At his touch the window crumbled into tiny fragments. He swung into the building and re-emerged in a few moments. "I found nothing save dust. Can either of you tell me why the glass disintegrated?"

Gertrude thought a moment. "Unlike metal or stone, glass is not completely stable. It slowly crystalizes, loses its strength."

"But," objected Tong, "that would take ages."

They entered several other buildings and found them empty shells. The monk suddenly pointed to a decoration on one building. "I can read that."

"What! How?"

"There is a secret language, *Ganor,* known only to priests. Medical knowledge, especially the control of demons, is always written in Ganor. The inscriptions on these buildings are the most ancient form of Ganor."

"That means," commented Gertrude, "that through the centuries there has been some contact between the dwellers at Ul Chalan and the native Tibetans."

Jar took the lead, moving with clear purpose through the silent city. Tong had been completely calm facing tanks and savage dogs. Now his nerves were worn raw by a mystery he could not solve. At length Jar pointed to a window in a building. "This city follows a pattern. If I read it correctly, this is one of the few buildings which may contain something interesting.

The rest contain only the dust of ages."

Tong needed a focal point for his anger. With a roar he charged forward, leaped to the window and smashed it with his massive fist. The window did not break, and Tong shook his hand, cursing profusely. The building was lavishly decorated and, grasping the decorations, he levered himself into a position that allowed him to kick the window with his full strength. Gertrude was frightened that when the glass broke, the major would be seriously cut, but the glass did not break. Instead, under Tong's pounding the frame slowly yielded. The three adventurers crawled through into the building.

The building was a great empty shell, but Jar pointed to one corner and raced toward it. In that corner they found a narrow hard cot, twelve feet long. On top of the cot lay a suit of clothes. The style of the clothing was neither Tibetan nor Chinese but was vaguely oriental. They would have fit a very slender man, ten feet tall. There were sandals at the end of the cot. Gertrude examined the clothes and found underclothing within. If the suit had a wearer, his right hand would have rested in a certain spot. Gertrude looked there and found a ring. The pattern of the ring was a thrice-coiled serpent swallowing its tail and the workmanship was exquisite.

Meanwhile Jar had been busy examining the two objects which stood beside the bed: what appeared to be a Buddhist prayer wheel and a book. His examination of the wheel was superficial but the book seemed to hypnotize him. With infinitely tender care he slowly opened the book and began reading. He whispered, "All the medicine I ever learned is a blurred copy of this wisdom." Then he was silent, completely spellbound by the book.

Tong's shouts at the reading priest drew no response. Turning to Gertrude, Tong asked in a dangerously calm tone, "Will you explain this to me?"

"Yes. What have you deduced?"

"Only that these are the remains of a tall man or manlike creature. Long ago it met the same fate as the wounded soldier."

"Not quite the same. This one came here knowing what would happen. He brought a book to read for a while. There is a window that he might see the sky. There are no doors in any of these buildings because none of those sealed in them would ever leave. This city is a cemetery."

"Then where are all the bodies?"

"The Tibetan burial custom is Ja-Tor, feeding the birds. I think these people followed a similar custom, using the demons that attacked us earlier."

"But who are these people?" There was a slight falter in Tong's angry voice.

"People whose normal home is very cold, very dry, has carbon dioxide in the atmosphere but no oxygen, and of course one-third Earth's gravity."

"You're saying this is a Martian Colony."

"Yes, this is the natural site for such a colony, the place on Earth most like Mars. It's as cold and dry, the air is not much thicker. I suspect there is a natural source for the carbon dioxide, so all they had to do was a little atmosphere management and supply the low gravity."

Tong was beginning to look pale. He sat down. "What an enormous madness. To travel millions of kilometers to die and be eaten by vermin. They even brought the vermin with them. Still, it's no more insane than my own fate."

"Tong, what ails you?"

The Chinese did not seem to hear. "I expected to die fighting the enemies of China, to be buried with honor. Instead I've poisoned myself and I shall be buried in an ancient Martian cemetery." The major collapsed onto the cot. His control of his facial muscles was rapidly fading. His arms and legs were twitching intensely.

"Tong, what poison?"

He spoke in a voice scarcely understandable. "That drop of sap the monk told me not to taste." He did not scream but his face was suddenly contorted in agony. "There's no point prolonging this, especially since I'm wasting oxygen you may need." Tong's shaking hand reached up to pull off his oxygen mask. Before he could do this, Gertrude's fist smashed into his chin. Gertrude thought Tong was such a strong brute, it would be awkward to handle him if it weren't for his glass chin. The unconscious major was quiet only briefly, then his frame was shaken by convulsions.

"Jar, wake up!" shouted Gertrude.

The monk snapped out of his reading daze. "Gertrude, this book—"

"Never mind the book. While you're studying medicine, Tong is dying. Can you help him?"

"I have no herbs which would help and the demons associated with poison are extremely difficult to exorcise. Still with what I just learned from this book, perhaps—" Jar began to chant. Gertrude could not identify the language he used but the sound was beautiful, peaceful, tender. Jar's voice seemed a musical instrument playing an odd but lovely version of a Brahms' lullaby.

Gertrude awoke on the floor, Jar Quinan bending anxiously over her. "Gertrude, are you all right? I'm afraid my spell put you to sleep."

"How's Tong?"

The monk gestured toward the cot. "He's resting comfortably, but we shall have to carry him out. Before we do that, we have enough

time to visit one more place, if we hurry."

Jar led Gertrude out of the city toward the forest of light. It lay before them, a radiant glory. In the presence of such wonder, the eye is blind to the ordinary; that which fails to interest it, cannot be recognized, so Jar and Gertrude walked past the mottled brown object, paying it no heed. They stood before the pulsating colored fire of the pillars. Seen at close hand each of these blazing columns was a symphony of intricate changing patterns of light. Some were intense, vital, surging torrents, others calm, soothing, gentle flows. The forest was a land of enchantment, of music and magic and dreams incarnated in living crystal. As Gertrude watched she began to hear quiet soft voices, though not with her ears. If she listened longer, they would tell her secrets, the history, deeds, and triumphs of the great ones of the long dead past. If she walked into the forest, she would see visions, the glory that was, the faces of the mighty and noble. She would see the wealth, treasures, beauties of a civilization compared to which Earth's cities were mere anthills.

"Gertrude, please, we must leave." Jar's voice seemed to drift to her from far away.

"Why? We have time, lots of time."

"Perhaps we have a little time, but we have no strength. We must leave now before our wills fail completely."

It took a considerable effort of will but Gertrude turned away from the forest of light. They walked in silence back toward the city. Suddenly Gertrude shouted, "Jar, look! That building."

"Yes, it's odd, for it's not decorated or beautiful like the rest."

The building was a flattened sphere, about twenty-five feet high and forty feet wide. Its surface, in stark contrast to the other shining metal buildings, was dull, pitted and scarred in a peculiar pattern.

"That thing is covered with reentry burns," shouted Gertrude. "It's a flying saucer." She ran toward it and Jar Quinan ran after her.

"Gertrude, how can it be a vehicle without any discernible means of propulsion?"

Gertrude reached the building and replied, "It has to be something . . . look, it has a door."

"All right, let's see if anyone is home." With that the monk knocked on the door and called out a strange singsong phrase. The door slid silently back.

The voice from inside the ship was gentle, melodious but very weak. "Please come in, children."

Curiosity completely overpowered fear and Jar and Gertrude stepped inside. They walked down a short passageway and came to what was obviously a control room. There were several television

screens displaying the view from all sides of the ship, an assortment of instruments and controls, about as many as on a good sports car, and several contour chairs. A human being in one of those chairs would have fit like a four-year-old in a sports car bucket seat.

These details Gertrude noticed absently; her attention was focused on the being who sat in the control chair. The Martian, seen in the flesh, was nearly all feathers and bones. The tall angular figure might be described as a crossbreed between a Tibetan monk and a hoot owl, save for the eyes, blue, deep, filled with a sad wisdom. Strange as the creature appeared to humans it possessed an innate dignity and nobility which commanded respect, even reverence.

Jar bowed before the Martian. "Ancient Sothatalos, these unworthy ones come before you seeking enlightenment. Is there aught we may do to serve you?"

The beautiful voice answered, "Yes, there is a great service you may render. One for which I have waited many times your lifetime. Having waited so long, I can wait a little longer while your companion asks the questions which are obviously consuming her."

"What is the forest of light?"

"A memorial to my dead race. Of all my people I am the last. Soon I shall die and the last pillar of the forest shall also flame with light."

"Why did you build it here instead of on Mars? In fact why build this place, a place like Mars, when you have Mars?"

"Ul Chalan is not as Mars is now, but as she was countless ages ago. Here there is no wind; now the Derrafa, the devil wind, scourges the surface of Mars. Nothing can stand before it. The change came slowly and inexorably and we saw we must adapt to it or die."

"What change, what causes these fearful winds?"

"Twice a year one of the polar caps, which are carbon dioxide, evaporates and the released gas condenses at the other pole. Your world has storms but there is no comparison between them and the power of the Derrafa. Imagine if you will a hundred-foot ocean tidal wave. Thus the Derrafa sweeps all Mars twice a year."

"Why didn't you adapt to the change, build your cities underground?"

"There were those who suggested such an ignoble course but after much debate we found enlightenment. The wheel turns and turns and is forever still. We saw that it was the fullness of time, time for a world to die and a world to be born, time for the race of Martians to end and for the race of men to begin."

Dawning understanding almost unnerved Gertrude. Her voice was unsteady as she asked, "Are you referring to reincarnation?"

"Yes, we came to Ul Chalan to die as Martians and to be reborn as men."

Jar broke his silence. "Reverend one, what is this service we may do?"

"Nine centuries ago I and my companion finished our work on the memorial. I sealed him in his tomb and said the prayer for the dead for him, but there was none to pray over me. Long I have waited for someone to come, like a child staying awake long past his bedtime."

"I am a priest and can easily do this."

"Thank you, my son." The body of Sothatalos slumped over and was clearly dead.

Gertrude stared in wonder and awe. "How—how will his soul return? As whose child will he be reborn?"

Jar Quinan replied, "I know not, probably the next child conceived in this vicinity."

VI

Karl Winder had read the first two-thirds of Gertrude's report on her trip to Ul Chalan, then angrily summoned her to his office. While he waited for her to come, he paced the floor. Right now heads were rolling and unless every member of his section was faultless, Karl, as the administrator responsible, might find his head rolling. He knew Gertrude was annoyed about that incident with the computer, but he was dumbfounded when she submitted as a report a completely absurd fantasy. She knew that unless she withdrew the report both their careers would be ruined. Karl knew he would have to beg. Probably Gertrude would use her idiot smile on him. Then he'd have to beg just to get her to admit she recognized the problem.

Gertrude entered and her smile was large and more simpleminded than ever before. "Hi, Karl. What's the problem?"

"Look, Gertrude, I realize you have a right to be angry. The department sent you off on a dangerous wild-goose chase, then the instrument boys solved the problem." Karl thought it might be good psychology to distract Gertrude's anger away from the computer incident.

"I'm not mad about anything, Karl. What did the instrument boys learn?"

"It was Kinan. You met him at the Chief's office, he was the meteorologist. He got a NASA satellite to scan Ul Chalan with an IR spectroscope. It showed an extremely high concentration of carbon dioxide. Ul Chalan is a large bowl filled with CO_2. Such pockets of CO_2 occur when there are natural sources to release the gas and no wind to blow it away. Kinan then checked the satellite data on air circulation around Ul Chalan. It's an exceptionally stagnant re-

gion. We reconstruct the events as follows: Some Chinese thought they were chasing Tibetan rebels and blundered into Ul Chalan where they smothered. The Chinese assumed the men had met a superior rebel force and been wiped out. Naturally they counteracted with a larger force. They continued to escalate this war on inanimate nature until they finally sent in a full division of tanks. That many tanks put out a lot of carbon monoxide. The air in the trail to Ul Chalan is stagnant and there's not much of it. The Chinese were in the same position as an idiot who runs his car in a closed garage. Chan Si Ree ordered the nuclear missile fired at Ul Chalan in order to destroy the evidence of one of the greatest military blunders in history. His political enemies aborted the missile by sending it the autodestruct code. In view of his blunders they believed they had adequate ground for arranging his heart failure, but that started the Chinese civil war."

"Is there any hope of a negotiated settlement in that war?"

"Almost a certainty. Neither side really wants the war and we and the Russians are trying to mediate."

"Jar will be very happy to hear that. Now, Karl, what did you want?"

Warning bells began to go off in Karl's brain. "Gertrude, you didn't bring home that monk you mentioned in the report?"

"Yes, and I am having a lot of trouble getting him his back pay."

The warning bells were getting louder. "How did you get back so soon? You couldn't have used the escape route we planned."

"But that's in the last part of my report. We flew in the flying saucer."

The warning bells went silent as the danger took clear shape. Was there any remote possibility that Gertrude's report was true?

The door burst open and the Chief pushed Jar Quinan through.

"Just what is the idea of telling this Martian he could park his flying saucer in *my* parking space?"

Karl Winder could rise to an occasion. A lesser man, having never met Jar Quinan or told him anything, would have denied the accusation. Instead Karl said, "Sir, this man is not a Martian, but is one of my best agents. He and Gertrude captured that saucer at great peril to their lives. It can fly to the stars and will be of immense value to the national defense. May I remind you, sir, that they have plenty of parking spaces in Moscow and that this man has not been paid in the last five years. If you'll check the files you will find I have sent you numerous memos complaining about this unjust situation."

Karl thought the reference to the nonexistent memos in the files would help the Chief see the big picture and he was right. The old man mumbled, "Very good, carry

on, keep me informed. I will see this man is paid," and walked off.

Gertrude grinned at Karl. "That was wonderful the way you got Jar his pay. Now what's the problem, is there something wrong with my report?"

"Yes, it reads like a fantasy."

"But it's true."

"That's not the point. The report as it now stands will provoke angry disbelief. Many will be so angered that they will refuse to examine your evidence. I propose that we rewrite the report so that it will be both true and plausible."

Gertrude responded, "All right, what do you want to change?"

Karl was puzzled. If Gertrude wasn't trying to con him, why the idiot smile? Could she be on to something? "Well, ordinarily any report concerning ancient Martians would be difficult to make acceptable, but last week several key senators were briefed as to the existence of a long dead Martian civilization. You see NASA took some photos of one of the Martian moons which proved it to be an artificial satellite."

"But I thought it was the other way around," protested Gertrude, "that there was speculation that it might be a satellite but the Mars probe sent back photos showing a large chunk of rock."

"That's what the photos released to the public showed, but the photos which came back from Mars showed a very advanced satellite. So far the Russians appear to be unaware of the situation and we have a good chance of looting the satellite first."

"Then what's the problem?"

in times to come

■ Gordon R. Dickson's newest novel, "The Far Call," is a radical departure from Gordy's most recent works. This is a completely realistic story of the very near future, of a manned expedition to Mars, and of the politics on Earth that dooms it to failure. It's also a story of the triumph of the human spirit. Like many science fiction people, Gordy has become a "rocket freak," and has been present at almost every major space launching since Apollo 11. Out of this enthusiasm and dedication, and out of his detailed knowledge of the workings of the space program, has come an important new novel. The cover illustration, by John Schoenherr, shows one of the major hazards of prolonged spaceflight: the Sun.

"To start with, you claim a flying saucer."

"But we have it to show people."

"Yes, but Senator Sloan just made a speech saying there were no such things as flying saucers. It would be much better politics if we call the thing an unusual heavier-than-air flying machine."

"Why surely, Karl, if you think that's best."

"The next problem is the flying machine's propulsion mechanism. You say you just pull a lever and it accelerates in any direction without an equal and opposite reaction. That's a direct violation of Newton's laws of motion."

"But that's what it does, handles like a dream, too."

"Gertrude, saying things like that will anger every scientist in the department and we need good relations with them. Instead, let's say that preliminary scientific analysis indicates that the flying machine uses a neutrino drive, that is, it acquires momentum in one direction by emitting neutrinos preferentially in the other direction."

"Your pardon, sir," interrupted Jar Quinan. "There are some things which a classical Tibetan education does not include. A neutrino?"

"It is an indetectable particle."

"If it is indetectable, how can anyone possibly know it exists?"

"Logical deduction. The first law of thermodynamics states that mass-energy can not be created or destroyed. Sometimes an apparent violation is observed, mass-energy vanishes without trace. The explanation is that the missing mass energy is in indetectable particles."

"This first law, is it an *a priori* truth?"

"No, it is empirical. We know it is true because we have never seen an exception to it."

"Ah, thank you. If I am to live in the West, I must learn your curious superstitions."

Karl ignored that and went on. "Gertrude you say those demons passed right through solid metal walls to reach the Martians in their tombs, but you never actually saw that happen."

"No, but we saw a demon move through a granite block and we found a can of meat a demon had eaten without opening the can."

"Yes, but since you didn't see it happen, the report should say that the Martians were sealed in their tombs and the mechanism of subsequent biodegradation of the bodies is not established."

When Gertrude agreed to this, Karl turned to what he thought would be the most difficult part of the report to make plausible. "As to reincarnation, that's a religious issue and no official report of this agency of the United States Government should take a position on any religious issue. Moreover, Sothatalos may have been an impressive individual, but there is no evidence he was authorized to speak for the entire Martian race."

"But he was the entire Martian race, the last."

"That's beside the point. The report should say that the Martians built Ul Chalan for complex religious reasons, now being investigated."

Jar shrugged. "As you wish. The real proof of what we say will come in nine months when a great man is born."

Karl permitted himself a half smile. "Do you expect him to be born in Tibet or China?"

Gertrude replied sharply, "He will be born in Bronx Community Hospital."

Karl started. "You mean—"

Jar Quinan smiled proudly. "Yes, Gertrude and I are married and she is pregnant. I realize you Westerners look only at the surface and would fail to see what a wonderful and beautiful woman Gertrude is. Your blindness is my good fortune."

Karl mumbled, "Congratulations," rather numbly. No doubt in the part of the report he had not read Gertrude claimed that she had gotten pregnant in the line of duty to procure for the United States the soul of an ancient Martian in order to assist the national defense. Making that plausible would be a very difficult rewrite job.

Gertrude interrupted his unhappy thoughts. "Can you take care of the report? Jar and I want to leave on our honeymoon."

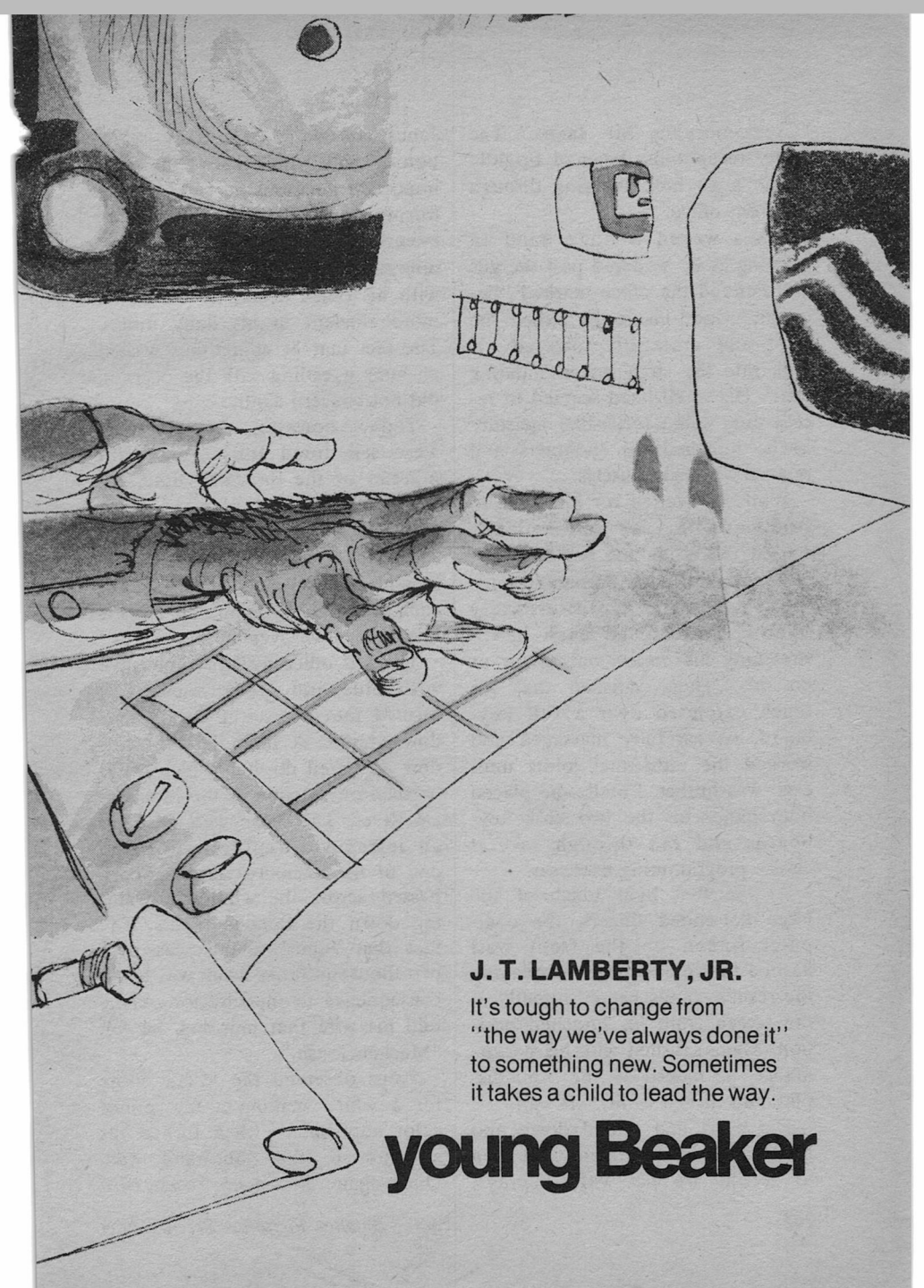
Karl groaned but took the path of least resistance. "All right, when will you be back?"

"In a month, but I'll be taking a leave of absence shortly thereafter."

"Why? You can still do desk work for some time."

"She's going to help me set up my clinic," explained the monk. "I find that here in this benighted country doctors know nothing of exorcising demons and as a result your people suffer all manner of diseases unknown in Tibet. I plan to open a clinic and heal all these people."

"After all," added Gertrude, "my mother always wanted me to marry a doctor." ■



J. T. LAMBERTY, JR.

It's tough to change from
"the way we've always done it"
to something new. Sometimes
it takes a child to lead the way.

young Beaker

"Good morning, Mr. Janus." The pretty receptionist beamed brightly at the large hulk laboring through the front office.

Janus waved a huge hand in greeting as he waddled past the girl and entered the office marked "Director." Once inside, he closed the door and gratefully lowered his bulk into the large accommodating chair. His small head seemed to recede into some turtle-like aperture as he hunched his shoulders and relaxed his neck muscles.

While he waited for his heart to stop pounding, he automatically started exercising his powerful fingers and hands in preparation for the day's work. He alternately opened and closed each hand, stretching his fingers out as far as possible. Then, satisfied that his reach extended over a full keyboard, he carefully massaged and worked the individual joints until each was limber. Finally, he placed both hands on the two desk keyboards and ran through several classic programming exercises.

At the first light touch of the large flat-ended fingers, the computer screen on the front wall flashed to life and began displaying the results. Janus peered intently at the screen from his hunched position. Then, satisfied with his performance, he flicked off the front display and turned to his left wall.

His heart had settled down and he could now devote full attention to setting up his wall displays. Janus considered this daily selection of office motif one of the most important decisions he would make during the course of the day's events. The director was of the opinion that, by matching his mood with his office decor, he would be more efficient in his daily duties. The fact that he sometimes wasted an hour wrestling with the decision did not concern Janus.

Today, however, the taxpayers were scheduled for a few extra minutes of the director's time, for the decision had already been made. During breakfast, he and his wife had discussed the problem at length and selected a theme for each wall. Once again, his fingers began to move over the keyboards.

The left office wall became alive with blue and green hues, then formed into a tasteful set of window drapes. A large picture window appeared through which could be seen one section of the Mackenzie River. The scene was live, and an intrepid adventurer, utilizing one of the ancient-style riverboats, passed across the window, caroming down the famous rapids. The fact that Janus' school was over two thousand miles away was of no consequence to the director. As he told his wife that morning, he felt "Mackenzie-ish."

Janus observed the idyllic scene for a while, making a few minor color adjustments, then turned his attention to the right-hand wall. Once again his fingers raced over

the two keyboards, touching levers and buttons.

The right-hand wall flashed into life, completely occupied by Dragoni's famous painting of the planet Uranus as seen from the satellite Umbriel. As an added attraction, the planet's two additional moons, Ariel and Miranda, were programmed into the scene and could be observed moving vertically across the picture.

Janus shook his head sadly. The moons were not part of the original painting. To the director, it seemed a sacrilege to mar a great work of art with what appeared to be two golf balls floating about idiotically. He waited until the two moons had disappeared behind the chilly wastes of the planet, then punched a button marked HOLD. There was no visible change to the picture, but the motion of the two satellites had stopped, and they would remain out of sight for the rest of the day.

Janus smirked triumphantly and turned again to the front wall directly opposite his desk. He sighed, pushed a key marked IN, and reluctantly began the day's business.

The screen sputtered a few times, then settled down to a tasteless black and white lettering format, displaying the first of the director's incoming correspondence.

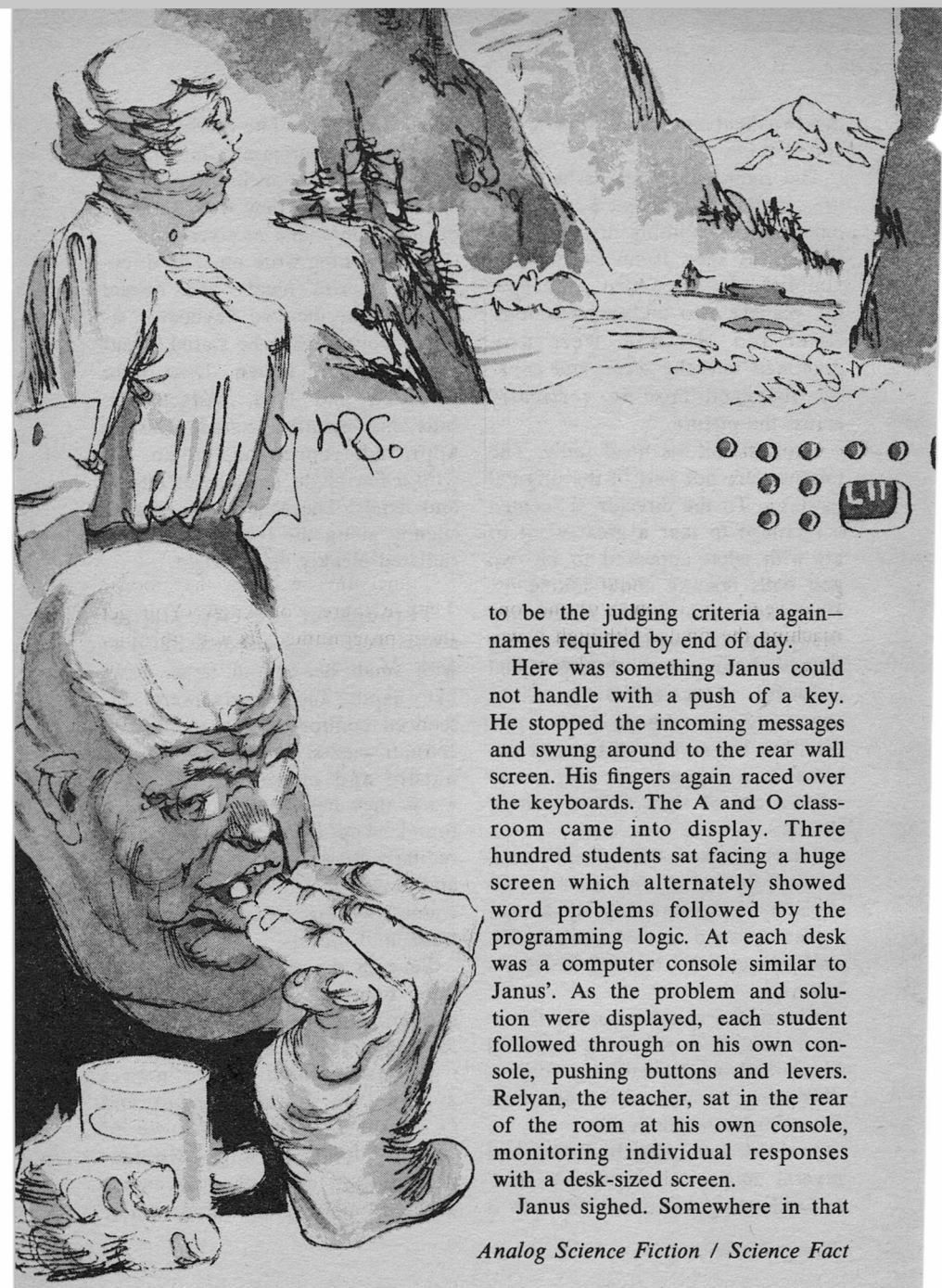
In quick succession he dispatched several minor administrative matters, dictating his directions into a small recorder. The verbal messages were programmed into literal form and shown on his screen. After his approval, they were shunted off to the intended receiver.

The morning wore on. The director's powerful hands and fingers moved over the two keyboards simultaneously while he stared ahead at the display screen. Data were corrected and filed, budgets set, bills paid, memos dictated, transfers approved, reprimands given, all with a few slight motions of fingers and hands. The Mackenzie gurgled silently along the left wall. Uranus radiated bleakly on the right.

Throughout the city, similar scenes were being enacted. Fat men with small heads and large, pawlike hands and fingers were ensconced comfortably in their wide contour chairs. Depending on the nature and magnitude of their work, they had one, two, three, or four keyboards on their desks. Hereditary, flat-ended fingers raced up and down the boards, adding accounts, writing letters, dispatching trains and rockets.

Beneath the city, the huge computer hummed softly, nourished by the millions of remote consoles feeding and requesting information.

Now the school district notices appeared on Janus' screen. A and O Mathematics Contests would start the following week—two candidates from each school—accuracy and least amount of computer time



to be the judging criteria again—names required by end of day.

Here was something Janus could not handle with a push of a key. He stopped the incoming messages and swung around to the rear wall screen. His fingers again raced over the keyboards. The A and O classroom came into display. Three hundred students sat facing a huge screen which alternately showed word problems followed by the programming logic. At each desk was a computer console similar to Janus'. As the problem and solution were displayed, each student followed through on his own console, pushing buttons and levers. Relyan, the teacher, sat in the rear of the room at his own console, monitoring individual responses with a desk-sized screen.

Janus sighed. Somewhere in that

mass were two students that he and Relyan had to pick to represent the school. Relyan hadn't mentioned any possibilities yet. This was because there were none, he supposed. It looked like good old Second School 572 wouldn't make it again.

This was bad, thought Janus. Five years in a row with no one reaching the finals. Although it was denied by the district, he knew that the contests were one method of rating the individual schools. And their directors.

A wave of despair and anxiety swept through Janus and the gnawing pain started in his stomach again. His heartbeat increased, and he signaled the receptionist outside.

"Yes, sir?"

"Malan, bring in some milk and rolls, please—and some of my pills."

Janus turned back to the classroom display and tried to rationalize himself into a calmer state.

The girl entered carrying a tray. She stopped suddenly, staring at the left wall.

"Why—Mr. Janus! That's beautiful! It's a river, isn't it? I've never seen one, but my folks have."

Janus was pleased with her obvious approval of his selection. He momentarily forgot about the contest, and his heartbeat slowed.

The young girl prattled on. "And that's Uranus, isn't it? We have one at home. But where are the moons? They're there, you know. You get them programmed in with the picture. My dad makes them go fast and slow—"

Janus felt a sharp pain in the center of his forehead. He removed his glasses and pinched the skin between his eyes.

"Uh—Malan, thank you for the milk and rolls. Just leave the tray here. I have a lot of work this morning."

"Yes, sir," said Malan. She looked at the rear screen. "Oh look! There's Mr. Relyan!" She giggled and left the room.

Janus quickly took the pill and gulped it down with the milk. As his heartbeat subsided, he grabbed up a doughnut and once again considered the classroom scene, munching thoughtfully.

The students were now working

on their own. Relyan had handed out an A and O problem set which applied to the class exercises they had just finished. Each problem had to be programmed, data input, accuracy and number of iterations determined. The answer appeared on a small display screen located on each desk. Also shown was a score for the student, calculated automatically by the computer. The score was based on the deviation of the answer from the correct solution and also on the amount of computer time used.

In addition to programming the problem correctly, the student had to come up with the best compromise between accuracy and machine time required for solution. The accuracy factor was called DFT (for Deviation From True) and the calculation time was MCT for (Machine Calculation Time). The score was simply determined by adding the two factors together with the lower scores being the most desirable. Thus, an answer close to exact would have a low DFT value but would probably require a large MCT and thus offset any advantage. Conversely, if a solution was obtained with a small value of MCT, the DFT was always very large.

Janus flicked a switch putting him on a voice circuit to Relyan. He saw the red light flash on the instructor's desk and waited until Relyan raised the small speaker to his ear.

"Janus here, Relly. How's it going?"

He smiled as the instructor straightened up and self-consciously started to arrange some papers on his desk.

"O.K., sir. We're doing an A and O problem set now. I was about to go onto individual console monitor."

"Good, Relly. I want to do that with you. We've got to come up with our two contest candidates today."

"Is it that time already? Good Heavens! I don't have anyone I'd want to send. These kids are getting dumber every year."

"Maybe you just teach in a dumb district," said Janus, sarcastically. "Or maybe it has something to do with the weather."

He saw Relyan redden. "I didn't mean it that way, sir. It's just that they—"

Janus cut him off. "I know what you mean, Relyan. And I agree. Even the District has noticed it. The test scores are getting larger and larger over the years. But that's no consolation to us. We've still got to send two up there next week. Who got the lowest on last week's test?"

"Chang and Granadi," said Relyan. "The scores are stored in Central. You can retrieve them now if you call up A and O Test 86/12."

"O.K., I'll do that. Go ahead with individual monitor. I'll be tak-

ing a look at those two soon."

"Right." Relyan started to cut out the voice circuit, then spoke again. "Oh, Mr. Janus—you still there?"

"Still here, Relly."

"Ah—there's one score which may be confusing to you. Boy named Beaker. Number 176. His score sum was zero for the whole test. I've put in a call to Maintenance and switched him to another console."

"Probably in the scoring circuit," said Janus. "We had that problem last year, only the score never went to zero. As I recall it was a large negative number. The kid started crying."

Relyan chuckled. "I don't blame him—although I would like to know how to get a minus MCT. That would really save us some money."

"Quit dreaming and get back to work," ordered Janus. "I'll get back with you later."

He switched off the voice circuit and swung around to the main display screen. His fingers moved over the two boards, requesting data retrieval from A and O test 86/12. The information flashed onto the screen.

APPLES AND ORANGES TEST 86/12
DATE GIVEN: CHURCHILL 9, 2486
SCORE RANGE REQUESTED: 0 TO 10
NUMBER OF SCORES IN THIS RANGE: 4

NAME	NUMBER	AVERAGE FOR TEST DFT	MCT	SCORE
BEAKER	176	0.0	0.0	0.0
GRANADI	17	3.4	3.5	6.9
CHANG	202	3.9	3.9	7.8
WASHOE	253	1.3	8.6	9.9

Janus chuckled. There was Beaker with his malfunctioning circuits and impossible score. He wondered why the boy hadn't said something to Relyan about his scoring circuits. And there was Washoe, making the classic beginner's error. He was closer to the correct answer than anyone, but had used almost three times as much machine time in the calculation. It had been just that type of sloppy programming—on a larger scale of course—that had caused a recent power failure and subsequent black-out of an entire city.

Washoe was out, thought Janus. It would take more than a week to get him out of that habit. Then it had to be Granadi and Chang, although neither of those scores was respectable. His own average as an aspiring young contestant had been around 3. Last year, the contest

was won with an average of 4.1. Relyan was right. Kids were getting dumber.

But what was Beaker's actual score? *We owe it to the boy to see what he can really do,* thought Janus. He swung around to the classroom display and set up the screen for individual monitoring of student 176.

Beaker's desk came on in a close-up monitoring mode. Janus could see the boy's two keyboards and the desk area in between. He also could see the small display console. The score capitulation from the last problem was still on the screen. Janus zoomed the monitor closer to read the results.

PROBLEM NO: 7
CALCULATED ANSWER: 5 APPLES
MCT: 0.00 SECONDS
DFT: 0.00 PERCENT
SCORE: 0.00

Janus moved the monitor back to watch the boy while he puzzled over the screen display. The calculated answer was right, evidently, as shown by a zero DFT. But the calculation time was zero! Janus frowned. The boy's eyes were closed and he appeared to be asleep. Then his hand moved to the right keyboard. The boy's fingers punched two buttons and the display screen changed. Janus again zoomed in to watch the screen.

PROBLEM NO: 8
CALCULATED ANSWER: 3 ORANGES
MCT: 0.00 SECONDS
DFT: 0.00 PERCENT
SCORE: 0.00

Finally it came to him. The boy had an answer sheet for the problem set and was entering the solution manually. The computer logic was such that a score was calculated on the numerical value of the solution, no matter how it was entered. His answer was exact, therefore a zero DFT. No calculating time required, hence the zero MCT.

Janus got on the voice circuit to Relyan again.

"I've solved your Beaker problem, Relly. You can call off the maintenance people on his old console. He's got an answer sheet and is entering the solution manually."

"So that's it!" exclaimed Relyan. "No wonder he's got zeros for scores. Wait a minute here—! That can't be! I selected those problems at random last night, and I programmed them for solution this morning before class. There's no formal answer sheet floating around on that set!"

"Well, he's got them somehow," said Janus. "Monitor him if you don't believe me. How else can you get exact answers with zero machine time?"

"That's got to be it," admitted Relyan.

"Anyhow," continued Janus, "Chang and Granadi are probably

the ones to send. Do you agree?"

Relyan sighed. "I suppose so, but neither of them has a chance."

"I agree," said Janus, "but what else can we do? Give them as much help this week as you can. I'll put their names in this afternoon. Meanwhile, let's you and I and young Mr. Beaker have a little talk in my office. Say—right after lunch?"

"Right, Chief. I'll tell him—see you then."

"Mr. Janus and Mr. Relyan are in conference right now. Would you please sit down? It won't be very long." Malan indicated the wooden chair next to Janus' door.

Beaker sat quietly and waited. Malan peered across her keyboards, studying the boy.

He's certainly a strange-looking young man, she thought. With that head sticking out so far, she could even see his neck sometimes. Malan decided that was what made him appear so tall. That and the fact that he looked like a pencil compared to Janus and Relyan.

And those fingers! Long and slim and rounded on the ends. She wondered how he managed a keyboard. Still, he was kind of attractive, she thought. In a tragic, ancient sort of a way.

Ancient! That was where she had seen him before. Or someone who resembled him. He looked just like the people on that historical wall display her folks had. The one that showed those tall, hungry-looking men putting up a flag on top of a hill.

A light flashed on her console. "You can go in now, Mr. Beaker."

Janus and Relyan were standing at the Mackenzie window watching another boatman bobbing up and down in the rapids. When the boat had gone off the screen, Janus turned to the boy.

"Sit down, Beaker. Mr. Relyan and I want you to do a little explaining. Right, Relyan?"

"Right, sir. We certainly do, uh—want that." Relyan smiled nervously at Beaker.

The director's voice had a cat and mouse ring to it, and he smiled maliciously at the boy.

"Mr. Beaker, your A and O scores on last week's test and again on today's problem sets have been zero. In fact they have been zero point zero zero. You can't get any lower than that, Beaker. Theoretically, you are the best math student the school or district has ever had. Would you like to explain how this can be?"

"Yes, sir," said Beaker. "It's because my MCT is zero in each case and so is my DFT. The score is the sum of the two para—"

"I know how the score is calculated, Beaker," said Janus. "I used to be an instructor myself. In fact, I was even a student once if you can believe that."

"Yes, sir," said Beaker.

"Well?"

"Well, uh, well what, sir?"

"Don't act stupid, Beaker! How can you explain getting an exact solution with zero machine time unless you have an answer sheet. You should have more sense than that. You know everything is monitored and stored. It's all there in the memory units. You have just electronically hung yourself boy! You can't even cheat cleverly. Now, if I were going to use an answer sheet, I would make a few phony calculations, just to get some time on the computer, then manually enter the answer. But I know the system better. You're only an amateur, Beaker. And a darn stupid one at that! This will probably wash you out!"

Janus had spoken savagely, expecting immediate submission, but all he saw was a confused look come over the young face. By this time, most students would be tearfully confessing.

"But sir—I don't have an answer sheet. How would I get one? How would I even know which problems Mr. Relyan would give?"

"That's exactly why we're here, Beaker. To find that out," said Janus. Then he continued, his voice sarcastic with feigned patience.

"All right, you say you don't have an answer sheet. Then how do you get the exact answers? Do you dream them? Maybe you do. I saw you with your eyes closed in class."

"No sir—I don't dream them," said Beaker. "I just—sort of—think of the answers. I don't know how to explain it, sir, but I figure out the answers in my head, then enter them manually. It's lots quicker than programming the problem, and the answers are all exact."

Janus removed his glasses and pinched the bridge of his nose again.

"Oh boy! I've been teaching for twenty years and directing for ten more, and I've never heard of anything like that! We place a multi-million-dollar computer right at your fingertips and you tell me you'd rather do it in your head. Now I know you're dumb!"

"That could be, sir—but you'll have to admit I have the lowest scores in the class. As you yourself said, you can't get any lower than zero."

Janus exploded. "Why you little—! Do you really expect me to believe—"

The director stopped in mid-sentence and put his hand over his heart. For a long minute he remained motionless, mouth open, staring straight ahead. Then he slowly moved his left hand to his desk, located a pill, and quickly popped it into his mouth.

Finally he spoke. "I'm O.K. Don't worry, you two. I'm not going to die yet. At least not until I get to the bottom of this. Right, Beaker?"

"Yes, sir, I—"

"Never mind, Beaker. While I

was—uh—indisposed there, I thought of a way to let you prove yourself. Are you willing?" The director's voice implied that Beaker had better be willing.

"Yes, sir. Uh—what is it?"

"If you can 'think up' these answers as you say," replied Janus, "then you shouldn't really object to thinking up a few more for me. Right?"

"Yes, sir. I mean, no, sir. I wouldn't mind."

The director reached into a desk drawer and brought out the green A and O Problem text. He handed the book to Relyan.

"Relyan will select a few problems at random and read them to us. You can think up the answer or whatever it is you do. I'll program it here as a check." Janus indicated his two keyboards with a wave of his hand.

He continued, "You better be exact, otherwise we can only assume you have been using answer sheets up till now. Understood?"

"Yes, sir."

"Is there anything you need to help you in this remarkable demonstration, Mr. Beaker?" Janus was enjoying himself now. The pill had taken full effect. He was relaxed and happy and looking forward to demonstrating his programming abilities.

"Well—I could use a piece of scratch paper and pencil if you have them," said Beaker.

"No, we don't," said Janus. "You've got to learn to use whatever tools are available. Quite often, you will find this may be a simple desk computer. Roughing it, as we used to say. Mr. Relyan—the problem, please."

The teacher read the problem. "Programmer Number One has seventeen apples. Programmer Number Two has thirteen apples. Programmer Number three has no apples. How can the total number of available apples be distributed among the three programmers so that each has the same amount?"

While the teacher spoke, Janus' fingers were moving over the keyboards, storing information and setting up printing formats. When Relyan finished the last sentence, Janus paused for a split second, then pushed several buttons, programming in the even distribution logic.

"Ten," said Beaker.

Janus looked up and stared at the student.

"Ten? Ten what?"

"Each programmer gets ten apples," said Beaker.

Janus snorted. "We'll see about that!"

He made a quick decision as to the number of iteration steps required. 10^8 should be enough, he thought. That way there would be no doubt as to accuracy. He pushed a button marked ITER, then another labeled 10^8. The answer immediately flashed on the display screen.

CALCULATED ANSWERS:
PROGRAMMER ONE: 1.00000000×10^1 APPLES
PROGRAMMER TWO: 1.00000000×10^1 APPLES
PROGRAMMER THREE: 1.00000000×10^1 APPLES
DFT: NOT KNOWN. TRUE SOLUTION NOT PREVIOUSLY ENTERED. PROBABLE ACCURACY: 1×10^{-8}
MCT: 8.7 SECONDS

"There you are," said Janus. "Programmer One has one point zero zero zero zero zero zero zero zero times ten to the one apples. Programmer Two has one point zero zero zero—in fact they each seem to have the same amount. Ah yes! I recall that was one criterion." He beamed triumphantly at Beaker.

"That's what I said—ten," said Beaker.

"Ten? That's not what the computer got," said Janus. "I got one point zero zero zero—"

Beaker interrupted, "I know, sir, but that is the same as ten."

"We'll see about that." Janus furiously punched more buttons, asking for another form of 1.00000000×10^1. He got 10.0000000×10^0.

"Try the literal button," suggested Beaker.

Janus did. The screen flashed again: TEN (PLUS OR MINUS 1.0×10^{-8}).

"Humph! I agree that the answer is ten," said Janus, "or close to it."

Then, to save face, he added, "But I shouldn't have to convert to literal form to prove it. After all, we calculate with numbers, not words."

"Yes, sir," said Beaker.

"That was just a warm-up, Beaker. Now we'll get down to some complete A and O problems. Those involving both apples *and* oranges." Janus looked critically at the boy, trying to detect some hesitancy.

"Yes, sir—both apples *and* oranges, sir."

"Very well, then—Relyan, apples *and* oranges, if you please."

The teacher intoned the next problem: "Student A has a sack of apples. Student B has a sack of oranges. There are five times more apples than oranges. The total number of both apples and oranges is eighteen. How many apples does student A have? How many oranges does student B have?"

Janus punched furiously. Beaker closed his eyes for a second, then said, "One point five zero zero zero zero zero zero zero zero times ten to the one apples for A, and three point zero zero zero zero zero zero zero zero times ten to the zero oranges for B."

Janus hadn't yet decided on his iteration scheme. He stared at the boy ominously.

"Write it down, Beaker. That way, there'll be no argument later."

"I don't have a pencil or paper, sir," said Beaker.

"GET HIM ONE, RELYAN!"

Relyan jumped to his feet and fished around in his pocket. Finally he came up with a pencil and handed it to the boy along with a piece of scratch paper. Beaker wrote down his answer.

Janus finished the setup for iteration and pushed ITER. They all looked at the screen.

CALCULATED ANSWERS:
STUDENT A: 1.50000000×10^{1} APPLES
STUDENT B: 3.00000000×10^{0} ORANGES
DFT: NOT KNOWN. TRUE SOLUTION NOT PREVIOUSLY ENTERED. PROBABLE ACCURACY: 1×10^{-8}
MCT: 9.1 SECONDS

"There's the correct solution," said Janus. "What did you get, Beaker?"

Beaker handed over the slip of paper. Janus looked at it critically, comparing it with the screen.

"I got the same thing, sir," volunteered Beaker. "In fact, I wrote it down exactly in that form up there on the screen."

"I can see that," said Janus, irritably. "Well, I'm still not convinced. Continue, Mr. Relyan."

Two hours later, Janus' console experienced severe overheating. The keyboard locked and could not be budged. Embarrassed, the Director notified Maintenance, then sat back in his large chair and smiled apologetically at Beaker.

"Well," said Janus, "I guess I have to believe you, Beaker. Would you tell us how in thunder you manage to do this?"

"I don't really know myself, sir. I guess Gramps making me learn the Times Tables has something to do with it."

"The what Table?"

"The Times Tables, sir. You know—two times two is four. Two times three is six. I know them all the way up to twelve times twelve."

"What on earth are you babbling about, Beaker? Please talk slower."

"It's simple multiplication, sir. Two taken twice is four. Two taken three—"

"Stop right there," said Janus. "Two what?"

"Two anything. Use oranges if you like," said Beaker. "Two oranges taken twice is four oranges. Two oranges taken three times is six oranges. Two oranges—"

Janus interrupted. "Do you mean to say that you memorized the fact that two oranges multiplied by two is, uh—what did you say it was?" The director's hand automatically moved to his console to perform the multiplication. Then he remembered the machine was inoperative.

"Four, sir. Four oranges."

"Yes—and two oranges multiplied by three is what?"

"Six oranges," said Beaker.

"You went to the trouble to memorize all that when you have a computer which can do it for you in a matter of nano-seconds?" Janus stared unbelievingly at Beaker.

"I had to, sir. Gramps made me do it. He doesn't think much of these computers."

"I suppose this, uh, 'Gramps', is your grandfather?" asked Janus.

"No, sir. He's my great grandfather. He says his father made him memorize them too."

"What about your grandfather and father?" asked Janus. "Don't they have anything to say about this?"

"Oh, no—Gramps made them memorize the Tables, too—years ago. But they forgot. I'm the only one in the family who uses them now."

Janus shuddered. What a horrible thing to do to children, he thought. Completely unnecessary regimentation of the mind!

"And by memorizing all these multiplication facts, you are able to—think up the answers?"

"Yes, sir. Except I also have to know my lets."

"Your 'Lets'?"

"Yes, sir—let A equal apples and let O equal oranges and let—"

"Never mind, Beaker." Janus removed his glasses again and pinched the bridge of his nose. "I think that's all for now. You may go. I'm sorry we wrongly accused you." The director pressed his temples wearily.

When the boy had gone, Janus looked at Relyan quizzically.

"What do you think? I mean about entering him in the contest."

"I don't know," said the teacher. "It doesn't seem quite fair. It's almost as if you sent along your own computer instead of a student. Did he really memorize all that stuff?"

"Yes—I believe the lad. Evidently when you have those, uh, things memorized, along with some other knowledge which he calls the 'Lets', you can sort of think up the answers."

"The whole thing is inconceivable to me," said Relyan. "Especially when you consider the fact that it's all so unnecessary."

"I know," said Janus. "But you have to admit he's better than you or I on the A and O problems."

Relyan sighed. "That's true. And he didn't overheat."

The two men stared at the Mackenzie for several minutes.

Finally, Relyan spoke. "You know, you said something earlier which was very interesting—that if you already knew the answer, you could perform a fake calculation on the machine to keep from getting a zero MCT. Well, along the same line of thinking, you could also enter a number slightly different from the solution in order to keep from getting a zero DFT."

Janus nodded thoughtfully. The men stared at the river again.

Finally, the director turned and spoke to the teacher. "Mr. Relyan,

I think our two entries in the annual A and O Mathematics Contest should be Beaker and Granadi."

"I agree, Mr. Janus. After all, they had the lowest scores in last week's test."

Janus nodded. "You can work with Granadi, Relyan. I'll—uh—sort of 'brief' Beaker on how he should use the computer up at the District. Other than that, he doesn't need any more help."

"No, sir," said Relyan. "He certainly doesn't need our help."

Beaker turned the test page and studied the last problem.

"School Director A has four apples and twelve oranges. School Director B has six apples and four oranges. How can the total amount of fruit be distributed between the two Directors so that A has four times as many apples as B, but B has seven times as many oranges as A?"

On a piece of scratch paper, Beaker wrote:

Apples: A + B = 10
A = 4B
4B + B = 10
5B = 10
B = 2
A = 8

Oranges: A + B = 16
B = 7A
A + 7A = 16
8A = 16
A = 2
B = 14

He then programmed a simple addition problem into the desk computer, obtained the solution, and erased the answers from the memory unit, thus establishing a finite calculation time for the problem.

Now he entered the problem answers, slightly altered.

A: APPLES = 8.001
B: APPLES = 1.999
A: ORANGES = 2.001
B: ORANGES = 13.999

The deviation from the actual answer was always multiplied by 1,000 to obtain a DFT value. Thus, Beaker knew that his average for the problem would be 1.0, an excellent score considering the machine calculation time would be only a few milliseconds.

His score came back on the desk screen.

PROBLEM 50—CONSOLE 27—BEAKER
AVERAGE DFT: 1.0
MCT: 0.002
PROBLEM SCORE: 1.002

The boy smiled and slipped the scratch paper under his shirt. He stood up and walked to the monitor's desk.

"Finished?" The monitor appeared surprised.

"Yes, I am," said Beaker.

"Couldn't do 'em all, eh? Well, you're not the only one. Three others have given up, too."

Beaker started to say something, then thought better. He stared at the floor and tried to look discouraged.

"Sign out here," said the monitor. "You'll know tomorrow where you stand—not very well, I suspect."

Beaker signed out and left the room. Surprised, Granadi watched the other half of Second School 572's math team walk out. He sighed and assumed the full burden of his school's academic prestige. He was on the twenty-seventh problem. Forty other students huddled over their consoles, moving buttons and levers and staring intently at their screens.

Janus was happily contemplating a remote Sierra lake on his left wall when Malan signaled. Without turning from the display screen, he quickly located the voice key.

"Yes?"

"Miss Dandrob from Advanced Computer Language to see you."

"Send her in," said Janus. He was at first slightly annoyed at the interruption until he remembered that Miss Dandrob had always commented favorably on his wall displays. He made a few last adjustments on the color, then huddled over his desk, obviously engrossed in some weighty academic matter.

The teacher entered and stood at the entrance. After a few seconds, she cleared her throat.

Janus looked up. "Ah, yes—Miss Dandrob. Sit down, please. I'll be with you in just one minute."

Janus turned back to his desk as the young woman sat. He leafed through some papers on his desk, punched a few keys on his board, and studied the screen intently. Then, satisfied that all was well, he turned to the teacher and beamed expansively.

"Well?"

As he had hoped, Miss Dandrob was looking at the left wall.

"That's really beautiful, sir," she said.

"Yes," agreed Janus, "one of my favorite places. It's called Highland Lake."

"Have you ever been there?" she asked.

"Good Heavens, no," said Janus. "Where would I find time to do anything like that?"

"I don't know—I just thought—"

"No, my dear, I would like to go there some day. But a director's job is very demanding. And besides, it's above seven thousand feet elevation, you know. I don't believe my doctor would allow it anyway. But I'm sure you didn't come here just to comment on my wall screen, did you, Miss Dandrob?"

"Oh no, sir! It's about Beaker, sir."

"Beaker? What in the devil has that boy been up to now? Winning the contest last week hasn't gone to his head, has it?"

"No, sir. Nothing like that. It's

just that he's doing, ah—different things in the class. Different than the other students, I mean."

"Like what?" Janus appeared amused.

"Well, as you know, in Advanced Computer Language we start off by first teaching the student English and how to write simple sentences, even though he'll never have an occasion to do this later on."

"Yes, yes—I know," said Janus. "Before writing a sentence or program statement in computer language, he first must be able to write in English. A rather useless requirement, in my opinion."

"I agree, sir," said Miss Dandrob. "But, nevertheless, District requires it. At any rate, Beaker is writing his own sentences, all right, but he's doing it differently."

"How's that?" asked Janus.

"First, his sentences actually convey some statement. It's just as if he were writing down what he was thinking. It's very disconcerting, sir. None of the other students do it. Then, he has the peculiar habit of making the last word of each sentence sound alike."

"I'm afraid I don't understand," said Janus. "Do you have an example?"

"I have some of his work. Listen to this—I think you'll see what I

mean." The teacher read from Beaker's paper.

Each day
I pray
That I
Might stay
Upon
This world
Another day.

She paused, then read on.

Thunder sounds, and the heavens cry,
And dark gray clouds race 'cross the sky.

"Any more?" asked Janus.

"Here's one he handed in today," said the teacher.

Why should I
Have been denied
The type of love
That satisfied?
I wish that I
Could say I tried
And failed.

"It has kind of a pleasant sound, doesn't it?" remarked Janus.

"Yes, I suppose it does," admitted the teacher. "But none of the other students do it. And I don't know how to grade him."

Janus now spoke with the hint of a threat. "Just be sure he passes—I'll leave that to you, Miss Dandrob." Then in a lighter tone, "Say, how does this sound?" He raised his eyes to the ceiling and concentrated.

I wish that I
Like a bird could fly.

He beamed triumphantly at Miss Dandrob. "Go on, try one—it's fun!" Obediently, the teacher closed her eyes.

I am the teacher
Of a boy named Beaker.

"I don't think that's right," said Janus. "If his name were Beacher, then it would be correct."

"How about this one, then?" said Miss Dandrob. "It's also a programming statement."

For N replaced by one,
Step one until done.

"Excellent!" Janus chuckled appreciatively. Miss Dandrob giggled.

In the outer office, Malan snorted and closed the voice monitor key.

Old goat! she thought. *He's twice her age—in there acting like a couple of imbecilic kids!*

The secretary swung around to her own keyboard and continued forming the electro-letter. In a few minutes she was humming softly.

I think I better
Form a letter
Else my boss
Will be so cross. ■

LEO SUMMERS

godsend

To a gorilla,
man is a horribly misshapen beast.

EDWARD WELLEN

He was so hideous at birth that his mother, believing a demon had possessed her, abondoned him at the jungle's edge to the demons everyone knew dwelled in the jungle. She was, as they say, little more than a child herself, one of many children of poor and unworldly farm folk, and the baby was the get of a passing stranger who had taken her by force, and she delivered the baby secretly in lonely pain and fear.

Almost she welcomed the baby's frightfulness as a sign to rid herself of the burden of child and guilt. She bit and tied off the clue that led back into the labyrinth of her womb. Then she stole home and remained silent about what had happened and even forgot in time it was anything more, as they say, than a bad dream.

The baby himself was far from silent. It was the old blind man living alone in the jungle who heard the wailing and found the baby and poked it with his stick to make sure it was not really an animal that snapped and bit, and took him in and gave him a name and brought him up.

The old blind man lived under a thatch by the side of a stream and hoed a painfully-cleared patch of vegetable garden, and set snares for smaller animals, and followed birdsong to find and eat the berries birds ate, though he never wandered too far from the smell and sound of the running water. It was on one such following of birdsong that he came upon the cross-trail of infantcry.

He carried the naked slimy thing back to his thatch and dipped his little finger in fermented fruit juice and stoppered the wailing while he wondered how to keep the baby alive.

Deep in his darkness he remembered and saw the roots that would nourish a baby, and by smell and feel, though his worn heart almost failed him at having to venture out of smell and sound of the stream,

he found them where they grew and brought them back in a basket he had woven. He cut out the eyes to plant for later, and for now he washed the tubers and steeped them and fed the baby the milky juice.

So the baby lived. And it thrived and fattened on boiled and mashed plants and on berries and on the meat and marrow of small animals. The old man named him Godsend and moved their home deeper into the jungle, far from anyone who might come to claim the child and take him away.

And as Godsend grew he learned all the old man knew and more. Still a small child, Godsend skilled himself in hunting with bow-and-arrow and spear as well as snare, and in making fire with firesticks, and in working metal, and in truth proved a godsend for an old blind man growing older and feebler.

And when Godsend was yet a stripling he thought to give the old man back his sight, for Godsend had studied the animals he caught and had learned the workings of bone and muscle and tissue and blood.

The old man was as full of fear as of hope, but he had come to have great faith in the boy, and even to be in awe of his mind and the work of his hands.

So Godsend forged a fine sharp blade, and the old man chewed a herb and put himself to sleep, and Godsend cut away the clouded lenses. When they unwrapped the cloth, and Godsend slipped over the old man's head a hoop of wood with two holes in which Godsend had fitted the lenses of animal eyes, the old man saw the light again and rejoiced.

But then he saw Godsend, and his heart failed him.

The boy knelt and pressed his hands on the old man's chest and leaned his weight on his hands and pumped the old man's heart back to life. But it was a short stay. The old man opened his eyes and smiled sadly and apologetically and tried to tell the boy kindly that every now and again a change took place in the seed of man, that sometimes it meant a great leap forward, sometimes a great leap backward. And that sometimes it happened that something at once terrible and beautiful took shape.

And that it seemed to him Godsend was this last, that there was a link between Godsend's bodily deformity and his soaring and questing mind.

And so, looking at Godsend with love and sorrow, the old man left him with a warning and a promise.

A warning that if he went out into the world beyond the jungle and tried to mingle with the people who lived in the wide world he would only do himself great hurt.

And a promise that if he stayed hidden in the jungle and single-mindedly sought the secrets of earth, air, water, and fire he would

work wonders such as the world had never known.

Toward the end the old man's voice grew thick, for he was weary, and he closed his eyes and drifted away for good.

In the days of mourning and loneliness after he buried the old man, Godsend felt the pull of people grow stronger and stronger. The old man's warning became fainter and fainter in his mind. And at last he yielded to the pull and went with it to the edge of the jungle.

He stared out at a world of openness, of great cleared spaces for growing crops, of scatters and clusters of dwellings. And as his face hung loose in wonder he saw coming toward him the first person other than the old man.

It was a child chasing a butterfly across furrows, the lure of jeweled wings making the child forget the nearness of forbidden jungle.

Godsend felt a rush of delight. The child was beautiful, the butterfly was beautiful, the wide world was beautiful.

And as though with a will of its own Godsend's hand swooped out and caught the butterfly. And Godsend ran smiling to meet the child and give it the butterfly.

It was a girl, though he did not know that. She stopped on one foot. He called out in greeting and fluttered the hand that held the butterfly.

She whirled and ran from him screaming.

He stood stunned. Then after a time he stirred and saw the butterfly was dead and dusted it from his hand and turned and made his way back home, slowly, blindly.

It was long since he had last eaten or drunk but he did not care to think of eating or drinking. Still, his body moved him down to the stream to drink and wash and so lessen the dry tightness of his throat and the sweaty heat of his brow.

And remembering the set of the features of the one who had fled from him, and of the old man, and feeling with his hands his own, he scratched a channel from the stream to a hollow of earth. And when the hole filled with water he dammed the trench and so formed a still pool. And he looked at himself in the sweet water and grew bitter.

And now he realized that the old man had tried to explain to him at the end that he was a biological sport, a freak of nature, and for this reason he could never make a comfortable place for himself in the everyday company of mankind but must live out his life away from the eyes of people.

That is, unless he wished, for the sake of money (a thing hard for Godsend to grasp), to make a show of himself and endure staring eyes and mocking voices. But it had been the old man's thinking that it

was better for Godsend to stay in the jungle where there was no need for money to buy his other needs.

Godsend knew the old man was right and he told himself he would never go out among people. But out of bitterness and pride Godsend also vowed that he would create for himself here in the jungle something much more than mere self-sufficiency.

Above all else the power of light filled Godsend's mind as he grew to manhood, and he played with lenses and saw how he might wedge and unwedge bands of light. He saw quickly he needed lenses that would not rot away as the eye lenses of animals rotted, and he thought of the hardness and translucency of the stones on the bed of the stream and along the banks.

So he shaped and polished both clear stones and tinted stones, and found silver in the earth, and played with burning glasses and prisms and mirrors. He learned to capture and store sunlight and to release it in a spear of light that cut and fused and drilled and vaporized stone and metal.

Once he made a distorting mirror that twisted his features into normality. He smiled into it briefly, then smashed it to bits.

But throwing away those bits of sky-jungle-himself did not stop him from thinking of kinship and alienship.

From time to time he stole to the edge of the jungle and looked out upon the farms and villages. He could see how they grew at the expense of his jungle, for year by year they nibbled at it. But the jungle was vast and he could always move deeper into it and its thick cover hid him even from the silver-winged machines that had begun to thread the air.

He watched people through a telescope and found that by means of crystals he could listen to those he could not see (though by means of his beams of light he came to see even those who lived on the far side of the world, when they put shiny spheres into near space) and he smiled his twisted smile to see how they misused the earth's treasures.

But night after night he picked out the other planets and the stars. He felt more kinship with night and night's blazing jewels than with his fellow beings. Too, it helped him feel less earthbound, for he envied the people who flew with silver wings over the great roundness of the earth. So the years passed.

And then one night he saw a flash that fireballed as it burned a luminous trail through the air toward him. It rumbled and hissed and struck nearby with a shock that hurled him to the ground and slammed the breath from him.

He gulped air and got up and looked around. A cloud of dust and steam and smoke fixed it for him.

When he reached it he found a

fresh clearing and a crater, and in the crater a darkly glowing rock twice his height in diameter. The rock smelled of hot iron and nickel. He had viewed science telecasts on the scanner screen he had built and he knew what this must be: a meteorite, a piece of some shattered planet of this solar system.

His heart warmed to it; like himself, it was alien yet akin.

He went back for his laser and his power pack to slice the rock open and see what lay at the meteorite's heart.

He had not thought to tune in to learn how the others of the world were taking this blow and boon from space; he had failed to consider they must have sensed it. He knew his oversight when, just as he was beginning to cut through the meteorite, he heard a plane loudening. He darted out of sight as the plane droned into sight.

The plane swooped and circled, and Godsend knew it was mapping and photographing the print of destruction and the crater and the meteorite. And he saw it would not be long before people hacked through to the heart of his jungle and found his home and his workshop and ended his safe apartness.

There would be staring eyes and mocking voices.

For a moment a savage fury possessed him. He would wipe them out with his laser beam if they invaded his jungle. He could not hope to win against the whole world, but he could at least show the world a freak was not a thing to take lightly.

No. There was another way. From under the thick cover of his jungle he gave the plane his frightful smile, then turned and stole back to his workshop.

He stripped his home and shop of all the goods and gadgets he wished and needed to save—his tools and instruments, and his memory crystals and his computer, and his radio and television receivers, and his telescope and microscope, and his supply of preserved foods—and loaded them on a makeshift ground-effect sled. He vaporized his home and shop.

Then, covering his traces as he went, he sledded to the crater. By now the plane had gone. He put on his tinted goggles and played his laser beam on the rock.

He worked the rock into a shell, smooth on the inside, save for one section that he left a molten mass as though the drive had fused on landing or as though its fusion had caused the crash. He stowed his things aboard, vaporized the sled, then fitted the openings in the shell with an air lock and a quartz window.

Now the sky-rock would pass as a ship from space and he himself would pass as a visitor from space.

He even picked out the star. He had worked through the day and it was night again. And there was the

star he would tell them he came from. No; there was the star he would point to. It would have to seem to take him a while to learn to speak their tongues.

Now it should not appear strange to them when they came and found him here that he looked alien. How else should a being from space look?

But if they still found him a thing of horror, a thing to stare at and mock, he had an answer. Not fury, hot or cold; he was beyond that. He was already working out in his mind a simple star drive to build—or seem to rebuild—in his spaceship. He dreamed of it till dawn.

It was well he had hurried, for the people did not hack the long way through the jungle to the place where the object from space had landed. Instead, at dawn, they flew back over the place and a number of them parachuted into the crater.

Godsend came forth.

He made a sign of peace and smiled.

His horrible smile did not cause them to turn and run from him. Nor did they mock. They stepped slowly forward in awe and reverence.

Godsend let out his breath.

No hurry to build the drive. There would be time for space. The night was always there with its stars. Right now the star he had been born under was shining bright. ■

THE REFERENCE LIBRARY

P. Schuyler Miller

THE CAMPBELL YEARS

Two massive collections of stories, in the bookstores as 1972 dissolved into 1973, gave us a new—or, at least, another—look at what Isaac Asimov calls "the Campbell years" of American science fiction. Both are Doubleday books, and may be out in SF Book Club editions before you see this. First on the scene was Dr. A's own collection-with-commentary, "The Early Asimov" (540 pages; $10.00). It was followed by the first of a series of retrospective anthologies edited by Harry Harrison and Brian W. Aldiss, "The Astounding-Analog Reader: Volume I" (530 pages; $7.95). Both books, in different but complementary ways, show how John Campbell shaped present-day science fiction through this magazine.

Astounding/Analog has not had any lack of recognition in the past. Most of the first great anthology of "modern" science fiction, Raymond J. Healy and J. Francis McComas' "Adventures in Time and Space" (1946) came from Astounding. Most of this classic collection is still in print in the Modern Library edition as "Famous Science Fiction Stories" (1957 and still going strong). Fragments have also been in paperback, from Bantam and others.

John Campbell followed up with his own selection, "The Astounding Science Fiction Anthology," in 1952, and followed that ten years later with "Prologue to Analog" and a series of annual collections from the magazine, "Analog 1" in 1963, through "Analog 8," in 1971.

The anthologies Harrison and Aldiss are editing cover this same ground, and with many of the same stories, but in a way nobody has done before. They have selected stories that characterize Astounding Science Fiction as it developed from 1932 (one of John's own stories, "Forgetfulness," written under the pseudonym "Don A. Stuart" that he used for his probing departures from the formulas of the times) down to 1946. Harrison and Aldiss present the stories in five overlapping groups, with their own introductory commentary on the stories and what they show about ASF as it evolved and dragged SF with it.

There are obvious landmark stories—Harry Bates' "Farewell to the Master," Asimov's great "Nightfall," Robert Heinlein's "By His Bootstraps" (as "Anson MacDonald"), Clifford Simak's "City," Murray Leinster's "First Contact"

(did it really appear twenty-eight years ago?). There are others that won't be so familiar. I had forgotten that Alfred Bester wrote "The Push of a Finger" for Astounding in 1942. A. E. van Vogt is represented by "The Storm" instead of "Black Destroyer" or one of the other classics you would expect. Henry Kuttner, as "Lawrence O'Donnell," introduced his brief series on the submarine keeps of Venus with "Clash by Night"—and Lancer has just brought out another paperback edition of its better-known, book-length sequel, "Fury," with an introduction by C. L. Moore that tells how she and her husband, totally different as writers, merged their styles and personalities in such grand science fiction. She used the O'Donnell name herself for "Vintage Season," also in the book. I am in the book, too, with about my only attempt to write an action story (not very notably). So are Raymond Gallun, Ross Rocklynne, A. Bertram Chandler, and Fredric Brown.

New readers of Analog must read this anthology. Old-timers will be compelled to.

The Harrison-Aldiss commentary makes their anthology more than just a collection of old stories, and Isaac Asimov's makes his collection a landmark in its own right. What he has done is reprint everything he ever sold that hasn't already been put between hard covers. That includes some pretty dreadful stuff—as nobody knows better than Dr. A—and some that are just as good, and maybe better, than some of his other stories that have been reprinted over and over. "Blind Alley," for example (Groff Conklin considered it one of the best of 1946). "No Connection." "Red Queen's Race." "Mother Earth." And that dead-pan classic, "The Endochronic Properties of Resublimated Thiotimoline."

But you will read the book—and people will study it—for the running autobiography that accompanies the stories, tells how and why they were written, and although only about a third of the twenty-seven stories appeared in Astounding, shows how John Campbell worked to make good writers and a great magazine.

Isaac Asimov isn't one of those writers who burst on the world with their first story, like Stanley Weinbaum with "A Martian Odyssey," or van Vogt with "Black Destroyer," great from the start. I originally intended to call this column "It Ain't Easy," because that is the message the book has for anyone who wants to write science fiction—who wants to write anything—and who is lucky enough to find an editor like John Campbell to show him how.

ORBIT 11

edited by Damon Knight • G.P. Putnam's Sons, New York • 1972 • 255 pp. • $5.95

As editor of this series of anthologies of original "speculative fiction"—the oldest currently running, and one that invariably produces several nominees and often as not a few winners of Nebula and Hugo awards—Damon Knight seems to have appointed himself the Ameri-

can guru of the so-called "New Wave." (Harlan Ellison is not really a rival for the title: the farthest out of the stories he buys for his "Dangerous Visions" anthologies are, in fact, stories.)

There are twenty stories in this second 1972 collection. ("Orbit 10" is out for 95 cents as a Berkley paperback, with an index to the first ten volumes.) If I can decipher my notes, I consider seven of the twenty science fiction of a sort. The rest are a mixture of fantasies, symbolic fantasies (perhaps this is the new meaning of "SF"), and stories which are not much more than pictures of dehumanized future—or present—societies. Three hardly fit any of these categories, though they may perhaps be surrealistic, or speculative, or symbolic, or something that begins with an "S." Some of these are certainly very good stories. They just aren't science fiction by my criteria.

So let's see what you do have if you buy the book.

The best story is the opener, Gene Wolfe's "Alien Stones." A starship encounters an alien vessel, boards it—and finds it a *Marie Celeste* of space, empty, abandoned for no apparent reason. Or is it? Investigators try to reconstruct the nature and science of the missing beings, and as they round out their picture it changes subtly and alarmingly. This one is a real story.

So is Hank Davis' "To Plant a Seed," in which mankind decides to immortalize itself by sending an encapsuled nucleus through the collapse of the universe into its next cycle. James Blish did it more convincingly at the end of the last part of his "Cities in Flight" series, but there he had four whole books to work with.

One of the grimmest stories in a grim book is C. L. Grant's "The Summer of the Irish Sea." It seems to me to contradict its own premise. We are shown a future England so overcrowded that branded convicts can be hunted like foxes and their heads taken as trophies . . . yet a countryside empty enough of people so that a hunted man can survive for years. In "Machines of Loving Grace" Gardner Dozois shows us another ugly future with forced immortality in a society where life isn't worth living. Dave Skal, in "They Cope," follows with a completely tranquilized society, dead-alive.

Things are brighter with Robert Thurston's "Goodbye, Shelley, Shirley, Charlotte, Charlene." The western Pennsylvania locale suggests that this may be a product of the Clarion SF Workshop (while it was still at Clarion College). It poses a puzzle that is never solved. Apparently Shelley is Shirley is Charlotte is Charlene (and others too). Are they androids? Members of a clone? You'll wonder and be teased.

Finally, Edward Wellen's "Down by the Old Maelstrom" gives us two people trapped in a zany dream of Marx Brothers police at Checkpoint Charlie, as they lie seemingly forgotten or abandoned in a sleep lab. This one grows on you.

There are other stories in the lot that I suppose I have to admit into

the "real" SF fold, since they show us future societies which we may bring on ourselves. Most of them are glimpses, very short. Vonda McIntyre's "Spectra" visualizes an inhumanly efficient mechanized metropolis in which people have become automatons. In Gary Wolf's "Dissolve," kids after the next and terminal war live out the old TV tapes they have found. Their fantasy is better than reality. The nurse in Steve Herbst's "Old Soul" may be telepathic. She almost has to be.

In still other stories the "S" stands for surrealism. In Edward Bryant's "Dune's Edge," five people perpetually climb a dune whose crest they can never reach. Write your own symbolism according to your own school of psychology. In Jack M. Dann's "The Drum Lollipop" love is horror and horror is love. In John Barfoot's "The Crystallization of the Myth," a normal jam on the Los Angeles freeway has become the ultimate jam of rusted cars and bleached skeletons. In Charles Platt's "New York Times," that matter-of-fact journal describes *götterdammerung.*

Then there are some "straight" stories: no science fiction, no fantasy, no macramé snarl of symbols. Just stories that you might read in *The New Yorker.* Frederik Pohl's "I Remember a Winter" in the Depression years. Kate Wilhelm's "On the Road to Honeyville" evokes time gone. Joe Haldeman's "Counterpoint" is the old, old coincidence tale in contemporary dress (Vietnam and all that).

I have some unabashed fantasies left. Philip José Farmer is the most unabashed, since he has brought some life into Poe's "M. Valdemar" in "Father's in the Basement" finishing his book. George Alec Effinger's "Things Go Better" is more surrealism on Interstate 80 (you can't avoid Grimmage, Pa.). James Sallis' "Doucement, S'Il Vous Plait" is a tale told in a letter.

Pictures. Visions. Hallucinations. Nightmares. If r.e.m. sleep is the kind that does you good, perhaps these are good for you too, but on the whole I think Harlan Ellison's "Dangerous Visions," outrageous as most of them are or try to be, are better company.

THERE WILL BE TIME

by Poul Anderson • Nelson Doubleday, Inc., Garden City, N.Y. • 1972 • 181 pp. • $1.49

I have been holding back on this book, waiting for the Signet paperback edition that may or may not come (the book has a credit statement to New American Library, Signet's publisher). The Nelson Doubleday imprint shows that the book is an original Science Fiction Book Club edition. It is because the Club publishes a good many books of this kind, not available elsewhere in hardback editions—if at all—that I belatedly joined. I try to report the original edition here, but these *are* originals. (I passed up another SFBC title, Poul Anderson's "The Dancer from Atlantis," because I waited for the Signet paperback and didn't find it here until recently.)

In this book (and "Dancer") Poul Anderson has made time

travel more plausible and rational than anyone since H. G. Wells invented it. His travelers seem to be mutants, scattered through past, present and future, with a kind of psionic ability to transport themselves and a relatively small additional mass through time for as "long" as they can hold their breath. They consequently progress pastward or futureward in short hops, and they are governed by a kind of temporal law of conservation of life span: if they spend five years in the past, they are five years older when they return to the time they left.

The only paradox that remains—and is shown as no paradox—is the traveler's ability to be in two places at the same time, or in the same place in two personae. Jack Havig's older self came back from the future to train and advise him as a boy, as Harlan Ellison does in his "One Life, Furnished in Early Poverty" in Damon Knight's anthology, "Orbit 8."

Havig goes back to the Crucifixion to look for fellow time tourists, and finds them, scouring time for others like themselves. They take him to the Eyrie, an enclave founded in the Midwest in the years after our world has largely destroyed itself in nuclear war. Their dictator is a traveler from the Nineteenth Century, crafty and determined to impose his pattern on the future. Ranged against him are the barbaric Mong (of whom we see little), nomads from China, and a peace-and-ecology oriented circum-Pacific society, the Maurai.

Havig throws in his lot with Caleb Wallis and his time-looting freebooters, but finds ways to establish a transtemporal existence for himself. Sent back to Constantinople to scout it for treasure, to be snatched before the Crusaders can get it in their sack of the city, he is too late to save his friends but does rescue and marry a girl he has known since childhood. They try to hide, but Wallis' hunters find him and she dies. Here Havig's war on the Eyrie, and his struggle to give Earth a good future, begin in earnest.

Time travel stories have fallen into two main categories: stories which explore the past or future from a modern man's point of view (as a historical novel, or a story laid wholly in the future should not), and stories that play with the paradoxes and contradictions of the concept, including the great alternate existence stories. I love 'em all, but Poul Anderson introduces a rationality into the game that makes it all new. If you've found and read "Dancer from Atlantis" in spite of my fumbling, this is better.

NEBULA AWARD STORIES SEVEN

edited by Lloyd Biggle Jr. • Harper & Row, New York • 1972 • 289 + xx pp. • $6.95

The Science Fiction Writers of America award four trophies each spring, for the best science fiction/fantasy novel, novella, novelette and short story published during the previous year. The winning novels and most of the finalists have usually been published in hardback or paperback editions be-

fore the voting takes place. The shorter fiction comes from the magazines, and increasingly from the anthologies of original stories that already outnumber the major magazines. And each year the SFWA sponsors an anthology containing the three winners, some of the runners-up, and an odd story or two to fill out the book. This one, Number Seven, is one of the best—not only for good stories (which have been surpassed before), but for the "bonus" chapters that the editor has persuaded three of his colleagues to write.

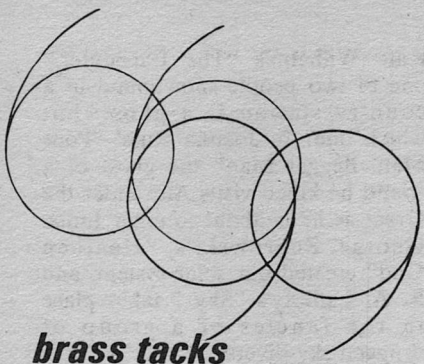
The book opens and closes with a pair of blockbusters that I've described before, in previous appearances: Poul Anderson's "The Queen of Air and Darkness," which begins like a fantasy—and isn't—and Katherine MacLean's "The Missing Man," which makes the strengths and terrors of our urban vivariums very real. Both won awards, as did Robert Silverberg's quiet "Good News from the Vatican," which describes the election of the first robot Pope. Silverberg's "A Time of Changes" was named best novel; Anderson's story also took the fans' "Hugo" award as best novelette of the year.

More of the other stories are fantasies and borderliners than is usual with these anthologies. Perhaps that is the way the voter/writers' tastes run these days; perhaps it is where they find the best writing. Stephen Goldin's "The Last Ghost" has been left behind to point the way to a new level of existence to the dead who follow—but men have become immortal. In Kate Wilhelm's "The Encounter," one of two people snowbound in a country station is a ghost—but which one? In Joanna Russ' "Poor Man, Beggar Man" the ghost of a friend he killed visits Alexander the Great as he is about to enter India. George Zebrowski's "Heathen God" created our solar system, and R. A. Lafferty's "Sky " takes place in the fancies of a group of drugged sky-divers.

Edgar Pangborn's "Mount Charity," though, persuades us that extraterrestrial intelligences can find a haven in an almost immortal hawk, a wolf, and an ape, who undertake a mission that may yet save Mankind. Gardner Dozois' "Horse of Air" is a nightmare of a future city that might almost be a curtain-raiser for Robert Heinlein's world in "I Will Fear No Evil." And Doris Pitkin Buck's "The Giberel" takes us into a grisly future in which Man may be reborn.

I said the bonus bits make the book outstanding. Damon Knight's "1971: The Year in Science Fiction" doesn't give him much chance to comment on the state of the art, but Poul Anderson's "The Science" offers a classification of science in science fiction that deserves to be reprinted in some of the textbooks that are being assembled for SF review courses, and Theodore Sturgeon supports his contention: "Good fiction cannot be wrought from ideas . . . Fiction is people."

(You'll find "Nebula Award Stories Six," edited by Clifford D. Simak, on the stands as Pocket Book No. 77542, for 95¢.)



brass tacks

Dear Mr. Bova:

Ralph E. Hamil's "The Vietnam War Centennial Celebration" is a good scenario but grossly inadequate on one important point, it seems.

Hamil has Walter Cronkite report President Lindsay's promise to evacuate "any Vietnamese who wish to follow" U. S. Troops: "There will be no 'bloodbath'." (And that's very good; both Lindsay and Cronkite *would* put "bloodbath" in quotation marks.) But above, Hamil has another character refer to "about a hundred thousand refugees in the Great Emigration" following President Lindsay's settlement.

Actually, if the Communist Party of North Vietnam were to take over South Vietnam, the number of South Vietnamese who would have to be liquidated is somewhere between one million and two million. And if one adds those who might well "wish to follow" rather than live under the Communist Party—not counting Laotians and Cambodians—well, one must assume that something pretty drastic happened to Lindsay's promise, though Mr. Hamil does not suggest it.

RICHARD M. HODGENS
25 Appleton Place
Glen Ridge, New Jersey 07028

That's your estimate of the situation—not Hamil's.

Dear Mr. Bova:

In your editorial in the October issue, you ask the question: How can we assure that the new technology of future decades will be used beneficially for the good of all the people and not selfishly by an autocratic government or dictatorship to solidify and maintain power. Well, the answer to that is to do something which you don't quite approve of, as revealed in the same editorial: give *all* power to the people. Complete and total democracy, even republican, is the *only* check on abuses of power by big government. One of the main problems facing this country today is that the people are not in control of the rapidly developing technology of the country. In a country like ours, which is a military-industrial superstate and not a democracy, technology is under the control of what some have called "the master planners," the would-be technocrats. This is true equally of the Soviet Union, another undemocratic military-industrial superstate (and one whose totalitarianism has, of course, reached a point much farther than this country's has drifted to). And the political revolution in America of the 1970's (not the radical revolution of the Angela Davises and the Mark Rudds but the populist revolution that nominated George McGovern)

is a reaction partly against this misuse and control of technology by a government which feels free to use electronic invention to spy on the opposing party.

All in all, though, the October issue was very good, and, with "Common Denominator," "To Be a Champion, Merciful and Brave," and "The Vietnam War Centennial Celebration," much more "liberal" overall than most recent issues have been . . .

I also especially liked "Star Hole," "Stretch of Time," and the science fact article. And, of course, Mr. Miller was absorbing as usual.

Some of the speculations on the future in Ralph Hamil's story, though, did strike me as a little farfetched, especially the political speculations. (Politics is my field.) I suspended my disbelief in the probability of their coming true for the story, but, as we *all* know, if Richard Nixon's impeached in 1976 over the Indochina War, he won't be succeeded by Vice-President John Lindsay but by Vice-President Spiro Agnew . . . unless, of course, the crisis in the government Mr. Hamil wrote about is more serious than now seems possible.

LESTER G. BOUTILLIER
2726 Castiglione Street
New Orleans, Louisiana

"The People" can be as undemocratic as any group—as witness the mob rule of the early French Revolution (which paved the way for Napoleon). As for Hamil's view of 1976 . . . well, wait and see!

Dear Mr. Bova:

October Editorial: ". . . These are problems that science fiction should and must examine . . ."

"Common Denominator": Social message—antiwar; World War Two plot propped up with some weary SF concepts.

"To Be a Champion, Merciful and Brave": Social message—species extinction/Indian rights; 1950 technology.

"Robots—RAMs from CAMs": Interesting article.

"The Star Hole": Social message—youth versus establishment; 1950 Hollywood SF.

"The Vietnam War Centennial Celebration": Social message—anti-Vietnam War; 1968 nostalgia item.

"The Pritcher Mass": Social message—ban of DDT is dangerous; 1960 juvenile SF thriller.

"Stretch of Time": No social message (published in error).

Don't miss next month's *new* stories! Buck Rogers flies in *Litter!* Flash Gordon battles in *Sierra Club!* Tarzan swings in *Pollution!*

Ben, your criteria for selecting stories (that is, contemporary "message" melodrama set in subdued backgrounds of out-dated SF) does not promote concern over present-day problems or increase the sales of Analog. Putting the cast of *All in the Family* in space costumes would not make it science fiction. The campus concerned probably wouldn't know the difference, but they have turned from SF to nostalgia and mysticism, leaving you with the hard-core SF reader. While we are used to writers

preaching their peculiar sermons, we demand their stories be imaginative, consistent extrapolations of current data in the physical and social sciences, incorporating new SF concepts or inspired renovation of old concepts.

If you're really hung up with a messiah complex: update your SF; junk the melodrama; put the message in the subdued background. Figure it out, people buy SF to read SF. With TV, radio and newspapers the "message" hard-sell is getting a phony, brassy ring. Soft-sell it, boy, soft-sell it. Remember, you're editing Analog, not *Today's Comment* or *Classic Reprints.*

JAY BAILEY
3822 37th Street South
Seattle, Washington

Each to his own taste, but I wouldn't want to be waiting for you to meet any boats!

Dear Mr. Bova:

Regarding "Request for Proposal" in the November 1972 issue . . . A very real problem exists in the immense proliferation of so-called welfare "clients," especially in urban areas. Any attempt to slow down this growth is met with cries of "Genocide!" and "Racism!" and "I'm all right, Jackism!"

A genuinely pragmatic solution that would probably cost less than present programs and actually do more would be to cease giving welfare "clients" *any* cash, but to provide, at federal expense, new housing in separate developments which would include systems of free distribution of food, clothing, TV sets, drug distribution and/or rehabilitation centers, and complete school and vocational training systems. Those who wished could become educated and earn their way (via diploma) out of the housing complex into the great, wide world. The rest could just lie about at their ease, enjoying all the comforts and necessities of modern life and recreation, the only catch being their physical restriction to the confines of that particular housing complex.

There are many who would object to the above proposal on the grounds that the welfare "client" would suffer a certain loss of dignity. What seems to have been forgotten in this age of the innocent criminal and the guilty victim is that one may *accept* charity with dignity but never *demand* charity with dignity.

HARVEY TELOWITZ
3465 Turf Road
Oceanside, New York 11572

Did you read "Pigeon City" in the same issue?

Dear Mr. Bova:

. . . I found the November issue interesting as usual. I particularly liked the short stories this time, thoroughly enjoying the ones by Richard DeBaun, C. N. Gloeckner, and Ken W. Purdy, and also liking but with a reservation the one by Anthony R. Lewis. The reservation I had about Mr. Lewis' story is this: somewhere in the tale, it's made known that in 1984 (in the story) there'll be a National Data System, a federal data bank filled with juicy tidbits from the personal lives of every one of its citizens

and resident aliens. I'm a firm opponent of government data banks on private citizens or groups, such as the one the Army compiled recently but was forced to destroy under public and political pressure. If the day ever comes when the Federal Government ever does accumulate a national data bank like the one referred to in Mr. Lewis' story, the day will be sad indeed for the people of the country which originated with the Declaration of Independence and has long cherished its Bill of Rights. But other than that, I liked "Request for Proposal."

The longer pieces in this issue, however, weren't as good as the shorter ones. I found "Cemetery World" and "Pigeon City" too pessimistic about the future of my part of the world (the good old U.S.A.) for my tastes, and the idea of people talking to machines and treating them like human secretaries in "F.O.D." was too much. The rest of the issue was good as usual, the science fact article on Cyrano de Bergerac (one of my favorite Renaissance people) being of particular interest. And even the editorial wasn't as offbeat as usual. (And I don't mean offbeat in the sense of something radical but in the sense of something . . . offbeat.) I just have one reservation about the proposal advanced therein regarding our government scientists. Being an ardent antitechnocrat, I'd embrace the proposal only if it were clear that "the decision of the judges would *not* be final." As for legalizing marijuana, I agree that all the precincts aren't in yet on the question of whether or not it's more harmful than other drugs now used legally in this country. But until it's proven conclusively (or "judged" by a Kantrowitz court) to be *un*harmful, I think the wise thing to do is to keep it illegal . . .

LESTER G. BOUTILLIER
2726 Castiglione Street
New Orleans, Louisiana 70119

You disagree with the government's invasion of your privacy. So does Lewis! That's one of the reasons why he wrote the story.

Dear Mr. Bova:

After reading the October article, "Robots–RAMs from CAMs," it occurred to me (I don't remember having read about it anywhere) that a CAM-like device might be a good solution to the problem of decreased exercise (and the consequent muscular difficulties upon return to Earth) encountered by astronauts on extended space voyages or in Skylab.

It might be possible to build a CAM machine equipped with an FFB circuit designed to *increase*—rather than supply, or decrease—the amount of muscular effort necessary for, say, gross movements. Thus, even in a zero-G environment, an astronaut in such an "added effort" CAM would encounter similar restrictions to his mobility as are usual on Earth. To raise a leg, or extend an arm, he would have to work against a counterpressure almost equaling the pull of Earth's gravity, in terms of effort.

Naturally, this idea might not be

appealing to astronauts, who, generally, have expressed a liking for the free-fall medium; but, if they are to avoid any serious muscular maladies arising from too-little exercise while in space, one possible alternative would be the use of these special CAMs.

ANIBAL GONZALEZ PEREZ
San Juan, Puerto Rico
There will be an exercycle in Skylab—but a CAM Indian wrestler?

Dear Mr. Bova:

War is indeed part of the human condition and will no doubt continue to be so as long as people continue to have differences of opinion. However, it isn't man's chief occupation or aim in life—and I suspect as science advances it will become even less so.

This being so, why does Analog run so damn many war stories? (I doubt that I am alone among Analog readers in being sick of war and anything connected with war.) Peace!

BRUCE SNOWDON
P.O. Box 349
Putney, Vermont 05346
War produces life-or-death situations that bring out the very best and worst in people; this is an ideal situation for fiction.

Dear Mr. Bova:

You are seriously in error in your views about Dr. Velikovsky. Your statement that "he tried to explain everything from the current state of the solar system to the fall of the walls of Jericho by one grand phenomenon . . ." is too inadequate not to be misleading—if not to others, then certainly to yourself.

Dr. Velikovsky's historical research led him to conclude that the accepted chronology of the ancient world was some six hundred years out of sync. Once he had accomplished the necessary adjustment, classical sources reinforced each other, and so did written and oral tradition from all over the planet. As you will find when you read his work, Dr. Velikovsky has meticulously identified and cited a great many of these sources.

Does it occur to you that, consciously or not, you were "projecting" when you used the cheesecloth simile? Rather Freudian, isn't it?

No, Mr. Bova, it just won't do. There are, after all, so many important current matters to deal with, and it would all be such a frightful bore, getting back into the fulminations of the Fifties . . . or would it?

I was in Boston in 1950 myself. Not surprisingly, it wasn't until P. Schuyler Miller (bless him!) in the pages of Analog called my attention to "The Velikovsky Affair" only five years ago that I discovered what had been going on.

You'd do well to follow suit if, like me, you prefer not to shuffle through the Seventies with egg all over your face.

ARCHIBALD C. MATTESON
Box 243
Trenton, New Jersey 08602
Let's see now . . . with the proper adjustment of the accepted chronology I can prove that the Battle of Waterloo was actually fought in 1835, and Halley's Comet . . . ■

EDITORIAL *continued from page 9*

are so lax at utilizing research ideas in their new products? Making lemon-scented toilet cleanser isn't my idea of bringing the power of modern science to the marketplace. Building cheap, reliable picturephones is. So is the ability to build a rail network that links the nation's cities with 150-mph trains.

Transportation. Speaking of the Japanese train system, if you've ever ridden the Turbotrain between Boston and New York, you can see where our R&D effort is being wasted. Here's a beautiful, sleek, powerful train capable of 100-mph-plus speed, chugging along at 35 mph because the roadbed is in disrepair and the traffic ahead isn't routed out of the way.

Transportation problems surround us, from intercity commutation to the smog-creating autos that clog our city streets. So far, what we've done in the way of transportation R&D is similar to the Army's initial ideas on how to use airplanes—as artillery spotters. Sure, fine. But airplanes are good for many other things, too. And instead of trying to patch costly pollution-control devices onto existing auto engines, or building fancy trains that ride Nineteenth Century rail systems, we should be attacking our transportation problems with all the bold inventiveness that characterized our military and aerospace R&D efforts.

Energy. We have an energy crisis for two reasons: First, the energy industry (oil, coal, electricity, natural gas) hasn't done a lick of decent R&D since Edison's day. The government has done some, mainly in nuclear power generation, but not enough to produce completely safe nuclear power plants. Second, the ecology lobbyists have exaggerated the safety problems of nuclear reactors and the pollution problems of fossil-fueled power plants to the point where vitally needed new power plants haven't been built or put into operation.

Of the two forces, most of the blame must fall on the energy industry. They've been taking in profits steadily for half a century and ignoring the crisis that's been building. For decades, they've spent less than one percent as much on R&D as they have on advertising.

Certainly there are new ideas worth pushing here. The use of hydrogen as a fuel, new forms of fossil-fueled power generators, better nuclear power plants, controlled thermonuclear fusion, superconducting transmission lines—all these concepts should be vigorously pursued and meshed together into a comprehensive attack on the energy crisis.

The fiscal 1974 budget calls for a total of $772 million to be spent on *all* forms of energy research. Nearly half that amount is going into development of the fast fission breeder reactor. Three-quarters of a

billion dollars sounds like a lot of money. It is. But it's nowhere near enough to do the job. It's less than four dollars a head for each American citizen. It's less than one-eighth the budget for military R&D. And all the guns, planes, and missiles in the world aren't going to help much if the whole nation is blacked out.

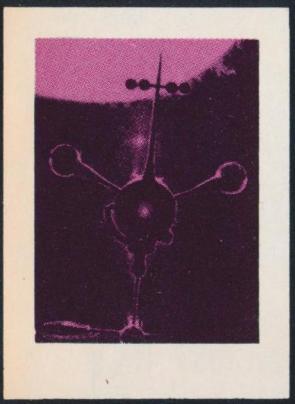
Jobs. A strong R&D program, history has shown, has a powerful multiplier effect on the economy. It builds jobs.

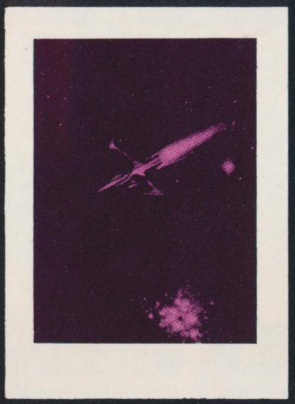
Nothing is more exasperating, or bitterly amusing, than to hear someone demand that "they ought to stop spending all that money on space and spend it here on Earth." As if the Apollo astronauts were depositing bundles of greenbacks on the lunar soil! R&D programs employ scientists and engineers, who in turn create employment for secretaries, clerks, technicians, grocers, bankers, metalworkers . . . *ad* almost *infinitum.* Think of what a dent in the unemployment rolls could be made if we tackled just the transportation problem in a meaningful way. Or pollution control. Or urban rebuilding.

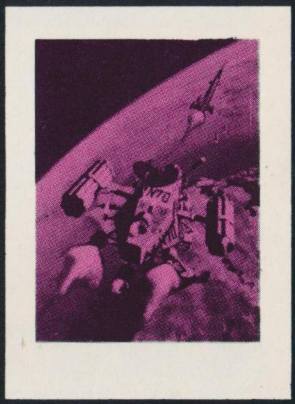
It won't happen this year. Possibly it won't happen until 1976, and the next Presidential election.

Or maybe . . .? Senator Edward (Teddy) Kennedy has maneuvered himself into the leadership of the Congress' new Office of Technology Assessment. As the prime Democratic hopeful for '76, he apparently wants to make science and technology a strong issue. Perhaps that—if nothing else—will move the Nixon Administration to friendlier attitudes toward our scientists and engineers.

THE EDITOR







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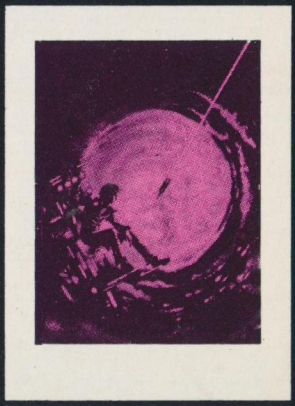

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