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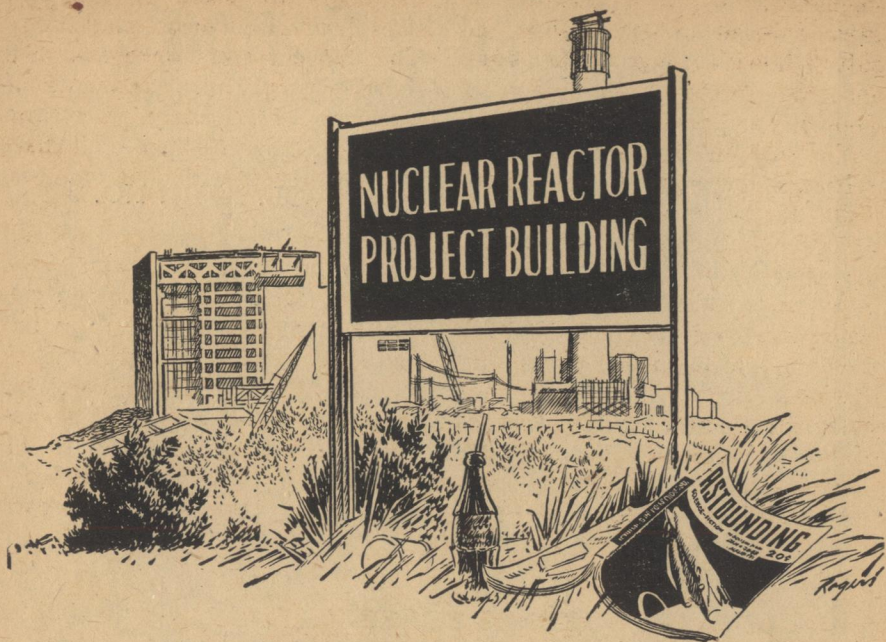
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AST—1H



BROOKHAVEN SKETCHES

Last September, while the Brookhaven National Laboratory pile was under construction, Hubert Rogers paid a visit to the site. The bare steel framework still under construction, had impressed me by its marked and eye-catching differentness—unlike any other steel-frame structure you'll ordinarily see. The immensely massive girders and cross-bracings of a bridge-pier or abutment are understandable; here, on

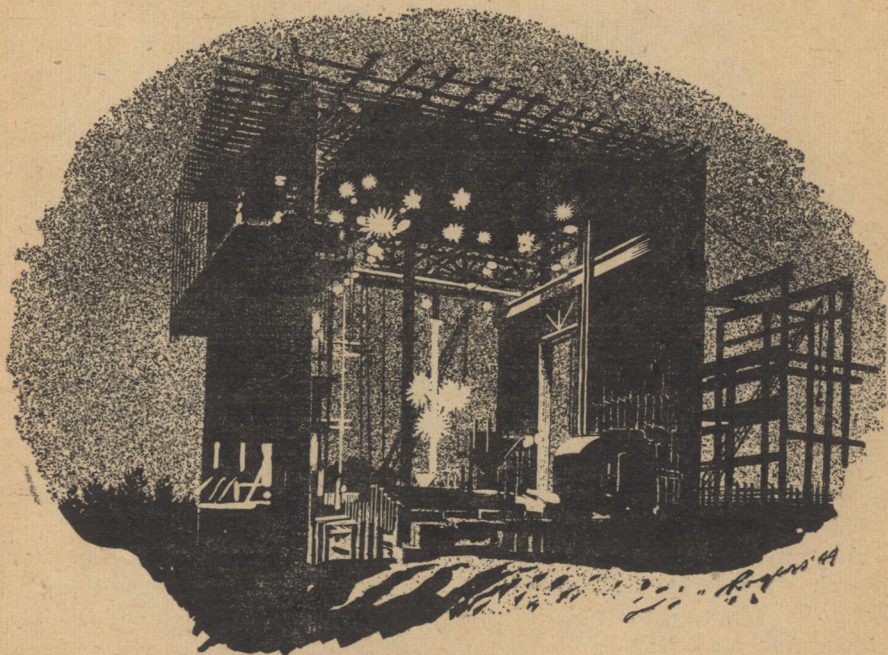
this structure, will rest the concentrated loads of the entire bridge. The spidery steel web of a skyscraper frame is understandable—steel is tough, strong metal, and even those pencil-line girders are more than adequate for ordinary building loads. But the pile building frame was girdered and cross-braced like a bridge-abutment, shaped like a building, and isolated from every other structure that

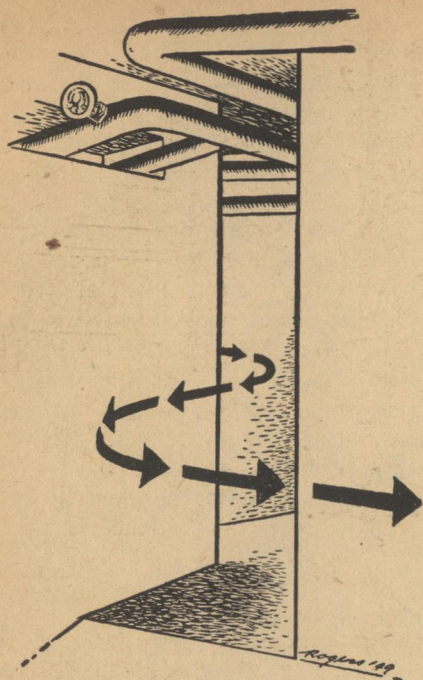
might seem to give it meaning. A raw, red-lead orange against the soft yellowish Long Island sand, and the patchy green-brown of summer's-end grasses.

The structure has to be built like a bridge abutment; it must carry loads of that magnitude—massive ton after ton of dense metal shielding, concrete shield-walls measured in as many solid feet as ordinary walls have inches. Laboratory rooms in which bench tops are thin plywood, treated with acid-proof stain, and laid over eight solid inches of lead. Storage rooms in which the stock cabinets have vault doors like those in a modern bank—only

the doors are made of soft lead slabs, bound in immense steel hasps. The hinges look, somehow, like something out of a catalogue of hardware for Early American Colonial houses—huge, clumsy-looking hinges, with long tongues. Lead is soft stuff, and hinges must be big and broad to clamp enough surface to keep the metal from drooping under its own weight. The immense strength of the building is as it must be; the nuclear reactor is heavy enough, but the associated equipment and laboratories are even heavier.

Behind it rises the poured-concrete stack; the atomic furnace

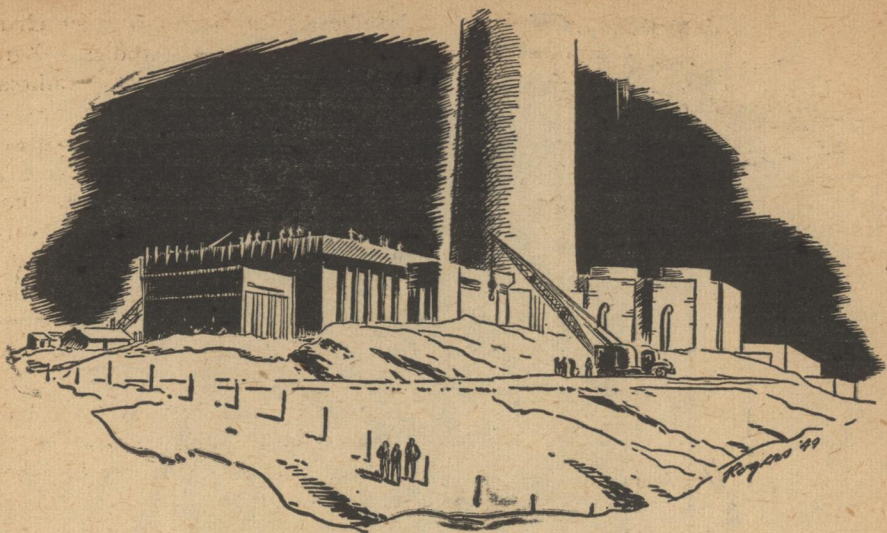




produces no smoke, but still that huge stack is essential. This pile is air-cooled; some two thousand horsepower is needed to blow the tornado of coolant through the uranium-graphite moderated reactor. The Brookhaven reactor is purely a research tool; no effort is being made to develop useful power, no effort is being made to produce plutonium. But the Associated Universities which operate the National Laboratory under government contract have set up and are setting up a diverse collection of research laboratories and projectors about it. The research ranges from Absorption coefficients to Zoological

studies, with Boron counter chambers, Carbon-14 studies, X-ray emission from synthetic radioisotopes and yttrium isotopes on the way. The laboratory workers around the pile naturally have no desire to breath in any of the "hot" hot air coming from the pile—the heat the thermometers read they don't mind; it's the "hot" signaled by ionization chambers and Geiger-tubes that they object to. The stack is designed to exhaust the air, contaminated with radioisotopes from its passage through the heart of the atomic furnace, at a height where it will be harmlessly carried away. The reactor will not be operated unless the wind-direction and air conditions are favorable—i.e., will carry the exhaust in a safe direction.

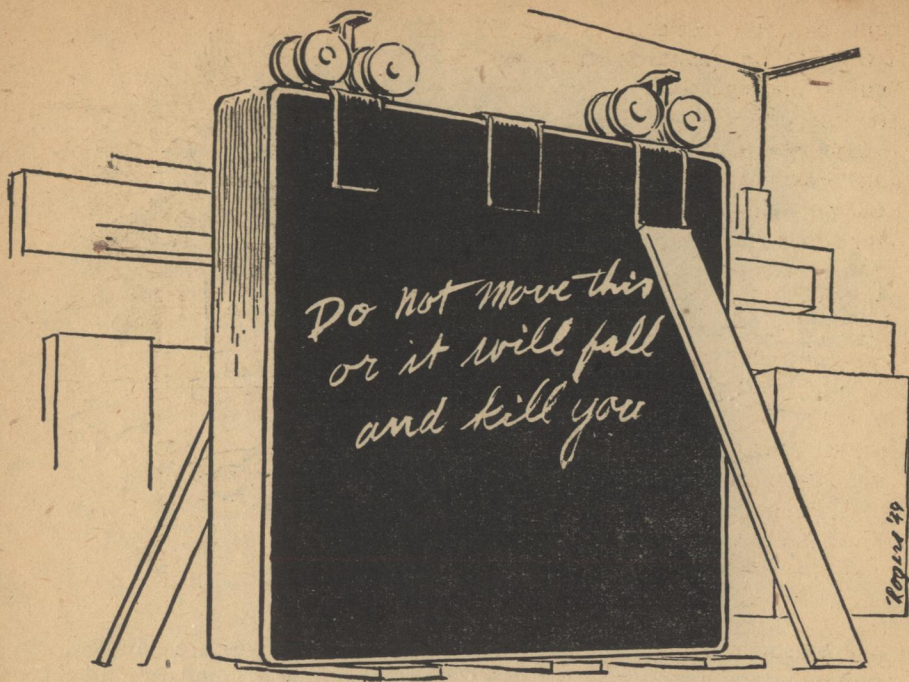
The reactor building itself will house the graphite-moderated uranium-fueled reactor proper, its associated equipment of metering and controlling equipment, blower equipment, et cetera, and a variety of special laboratories—the "hot" labs. These robot-operated-remote-controlled laboratories will permit the research specialists to handle safely the hottest radioactive materials. Slugs of uranium directly exposed in the pile, and seething with the most violently unstable, newly-created fission products—nuclear types that have half-lives measured in seconds—are not handled by human beings, and the labs which do handle them must be immediately adjacent, and massively shielded.



Even some of the biological laboratories must be set up as hot labs; when a mouse or guinea pig has been directly exposed inside the reactor, through one of the test openings, not only is the animal doomed, but anyone getting too close to it is apt to be in trouble.

Not all the laboratories will be in the reactor building proper, of course; Brookhaven's widely diversified program calls for far more laboratory space than will be available in even the large reactor building, and many of these other laboratories can be much more economically constructed. The "cold" labs, working with nonradioactive materials, certainly need no such expensive construction. The "warm" labs, where only mildly

lethal radioactives are handled, can be set up at a moderate distance from the reactor, and at ground level. That's highly advantageous; ground-level labs don't need immense and expensive I-beams for support of their massive walls and lead-slab shielding. The sketch at the top of page 6 shows the entrance—rather, as drawn, the exit—of one of the warm labs under construction last September. The labyrinth arrangement of the doorless entrance permits an experimenter—working in the lab on the left of the pipe-pierced eighteen-inch concrete wall—to leave in a hurry if some accident spills deadly radioactives. The sketch on page 8 was made inside that same warm-lab. The object in the foreground, with its starkly



simple declarative sentence scrawled in chalk was a slab of lead shielding about four feet high. It was destined to be part of the bench shielding, the workbench under construction is sketched lightly behind the slab.

But the symbol of Brookhaven, or any nuclear research lab, is properly the radiation meter—the small meter-faced black or gray crackle-finish gadget that sniffs out radiations. Not the big, high-sensitivity, portable-only-by-hand-truck models used in accurate radio-assay work, but the small hand model sniffer. The one that monitors the worker's hands and shoes, the activity remaining in a bench top due

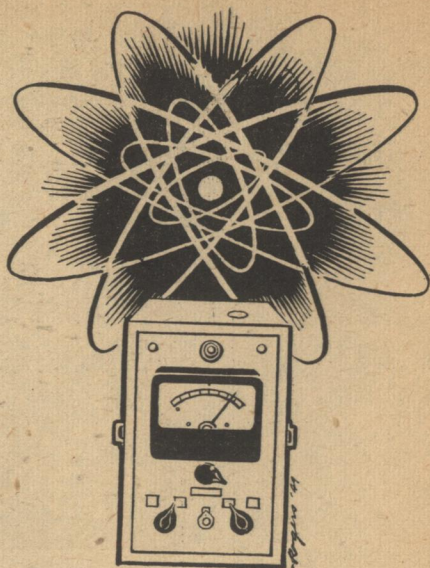
to accidental spillage, the gentle rain of droplets from boiling solutions, and the like. These are always and everywhere prominent if unobtrusive. The bench tops used in the warm-labs are not slab lead; they're chemically treated plywood or the like. The lead is underneath. Spillage, droplet contamination, a variety of factors inevitably and inescapably leads to contamination of any bench top in a radioisotope laboratory. Removing the contaminated layer of lead would be difficult; plywood, on the other hand, tends to soak up and retain the spillage, and is readily replaced.

Last September, the multi-billion-

volt particle accelerator was still purely in the planning stage, with only a model to show. This month of July, the reactor should be approaching full-scale operation, and the "cosmotron" getting into the construction phase. Brookhaven's laboratory facilities will soon include about as complete a range of nuclear research facilities as Man now knows how to build, as well as elaborate and immensely valuable facilities for research in pure chemistry, the specialized chemistry of the heavy and super-heavy elements, radioisotope chemistry and biochemistry, stable-isotope labeled research work, and pure biology with emphasis on the immensely important field of genetics and heredity. The only way one can study the operation and construction of a machine is by watching it in normal operation, then disassembling it and studying the parts, and finally partial reassembly and observation of the operation of parts of the whole mechanism.

The mechanism of heredity is a bit complex; the only way we can perform an analysis of the suggested sort is by changing around the parts of the mechanism to see what happens, and hard radiations—gamma rays, betas, neutrons and alphas—are the best disassembly tools available.

It's worthy of note, incidentally, that the research tools required today have reached a stage of size and cost that makes national co-opera-



tion essential. Brookhaven is operated by a co-operative association of the large Eastern universities, but the cost of the equipment would be a serious and probably impracticable drain on the financial resources of even these large and wealthy institutions. The reactor building alone probably costs somewhere in the neighborhood of \$75,000,000; the complete laboratory setup at Brookhaven is immensely expensive.

And immensely beneficial to the nation. But—now laboratory facilities have reached cost-figures so high that only large and wealthy nations can afford them!

THE EDITOR.



AGENT OF VEGA

BY JAMES H. SCHMITZ

A new author points out that, in an inhabited galaxy, trouble can grow to enormous size before any organization becomes aware that danger's a-brewing!

Illustrated by Quackenbush

"It just happens," the Third coordinator of the Vegan Confederacy explained patiently, "that the local Agent—it's Zone Seventeen Eighty-two—isn't available at the moment. In fact, he isn't expected to contact this HQ for at least another week.

And since the matter really needs prompt attention, and you happened to be passing within convenient range of the spot, I thought of you!"

"I like these little extra jobs I get whenever you think of me," commented the figure in the telepath

transmitter before him. It was that of a small, wiry man with rather cold yellow eyes—sitting against an undefined dark background, he might have been a minor criminal or the skipper of an aging space-tramp.

"After the last two of them, as I recall it," he continued pointedly, "I turned in my final mission report from the emergency treatment tank of my ship— And if you'll remember, I'd have been back in my own Zone by now if you hadn't sent me chasing wild-eyed rumor in this direction!"

He leaned forward with an obviously false air of hopeful anticipation. "Now this wouldn't just possibly be another hot lead on U-1, would it?"

"No, no! Nothing like that!" the Co-ordinator said soothingly. In his mental file the little man was listed as "Zone Agent Iliff, Zone Thirty-six Oh-Six; unrestricted utility; try not to irritate—" There was a good deal more of it, including the notation:

"U-1: The Agent's failure-shock regarding this subject has been developed over the past twelve-year period into a settled fear-fix of prime-motive proportions. The Agent may now be intrusted with the conclusion of this case, whenever the opportunity is presented."

That was no paradox to the Co-ordinator who, as Chief of the Department of Galactic Zones, was Iliff's immediate superior. He knew the peculiar qualities of his agents

—and how to make the most economical use of them, while they lasted.

"It's my own opinion," he offered cheerily, "that U-1 has been dead for years! Though I'll admit Correlation doesn't agree with me there."

"Correlation's often right," Iliff remarked, still watchfully. He added, "U-1 appeared excessively healthy the last time I got near him!"

"Well, that was twelve standard years ago," the Co-ordinator murmured. "If he were still around, he'd have taken a bite out of us before this—a big bite! Just to tell us he doesn't think the Galaxy is quite wide enough for him and the Confederacy both. He's not the type to lie low longer than he has to." He paused. "Or do you think you might have shaken some of his supremacy ideas out of him that last time?"

"Not likely," said Iliff. The voice that came from the transmitter, the thought that carried it, were equally impassive. "He booby-trapped me good! To him it wouldn't even have seemed like a fight."

The Co-ordinator shrugged. "Well, there you are! Anyway, this isn't that kind of job at all. It's actually a rather simple assignment." Iliff winced.

"No, I mean it! What this job takes is mostly tact—always one of your strongest points, Iliff."

The statement was not entirely true; but the Agent ignored it and the Co-ordinator went on serenely:

". . . so I've homed you full in-

formation on the case. Your ship should pick it up in an hour, but you might have questions; so here it is, in brief:

"Two weeks ago, the Bureau of Interstellar Crime sends an operative to a planet called Gull in Seventeen Eighty-two—that's a mono-planet system near Lycanno, just a bit off your present route. You been through that neighborhood before?"

Iloff blinked yellow eyes and produced a memory. "We went through Lycanno once. Seventeen or eighteen Habitables; population A-Class Human; Class D politics— How far is Gull from there?"

"Eighteen hours cruising speed, or a little less—but you're closer to it than that right now. This operative was to make positive identification of some ex-spacer called Tahmey, who'd been reported there, and dispose of him. Routine interstellar stuff, *but*—twenty-four hours ago, the operative sends back a message that she finds positive identification impossible . . . and that she wants a Zone Agent!"

He looked expectantly at Iloff. Both of them knew perfectly well that the execution of a retired piratical spacer was no part of a Zone Agent's job—furthermore, that every Interstellar operative was aware of the fact; and, finally, that such a request should have induced the Bureau to recall its operative for an immediate mental overhaul and several months' vacation before he or she could be risked on another job.

"Give," Iloff suggested patiently.

"The difference," the Co-ordinator explained, "is that the operative is one of our Lannai trainees!"

"I see," said the Agent.

He did. The Lannai were high type humanoids and the first people of their classification to be invited to join the Vegan Confederacy—till then open only to Homo sapiens and the interesting variety of mutant branches of that old Terrestrial stock.

The invitation had been sponsored, against formidable opposition, by the Department of Galactic Zones, with the obvious intention of having the same privilege extended later to as many humanoids and other nonhuman races as could meet the Confederacy's general standards.

As usual, the Department's motive was practical enough. Its king-sized job was to keep the eighteen thousand individual civilizations so far registered in its Zones out of as much dangerous trouble as it could, while nudging them unobtrusively, whenever the occasion was offered, just a little farther into the path of righteousness and order.

It was slow, dangerous, carefully unspectacular work, since it violated in fact and in spirit, every galactic treaty of nonintervention the Confederacy had ever signed. Worst of all, it was work for which the Department was, of necessity, monstrously understaffed.

The more political systems, races

and civilizations it could draw directly into the Confederacy, the fewer it would have to keep under that desperately sketchy kind of supervision. Regulations of membership in Vega's super-system were interpreted broadly, but even so they pretty well precluded any dangerous degree of deviation from the ideals that Vega championed.

And if, as a further consequence, Galactic Zones could then draw freely on the often startling abilities and talents of nonhuman peoples to aid in its titanic project—

The Department figuratively licked its chops.

The opposition was sufficiently rooted in old racial emotions to be extremely bitter and strong. The Traditionalists, working chiefly through the Confederacy's Department of Cultures, wanted no dealings with any race which could not trace its lineage back through the long centuries to Terra itself. Non-humans had played a significant part in the century-long savage struggles that weakened and finally shattered the first human Galactic Empire.

That mankind, as usual, had asked for it and that its grimmest and most powerful enemies were to be found nowadays among those who could and did claim the same distant Earth-parentage did not noticeably weaken the old argument, which to date had automatically excluded any other stock from membership. In the High Council of the Confeder-

acy, the Department of Cultures, backed by a conservative majority of the Confederacy's members, had, naturally enough, tremendous influence.

Galactic Zones, however—though not one citizen in fifty thousand knew of its existence, and though its arguments could not be openly advanced—had a trifle more.

So the Lannai were in—on probation.

"As you may have surmised," the Third Co-ordinator said glumly, "the Lannai haven't exactly been breaking their necks trying to get in with us, either. In fact, *their* government's had to work for the alliance against almost the same degree of popular disapproval; though on the whole they seem to be a rather more reasonable sort of people than we are. Highly developed natural telepaths, you know—that always seems to make folks a little easier to get along with."

"What's this one doing in Interstellar?" Iliff inquired.

"We've placed a few Lannai in almost every department of the government by now—not, of course, in Galactic Zones! The idea is to prove, to our people and theirs, that Lannai and humans can work for the same goal, share responsibilities, and so on. To prove generally that we're natural allies."

"Has it been proved?"

"Too early to say. They're bright enough and, of course, the ones they sent us were hand-picked and anxious to make good. This Interstellar

operative looked like one of the best. She's a kind of relative of the fifth ranking Lannai ruler. That's what would make it bad if it turned out she'd blown up under stress! For one thing, their pride could be hurt enough to make them bolt the alliance. But our Traditionalists certainly would be bound to hear about it, and," the Co-ordinator concluded heatedly, "the Co-ordinator of Cultures would be rising to his big feet again on the subject in Council!"

"An awkward situation, sir," Iliff sympathized, "demanding a great deal of tact. But then you have that!"

"I've got it," agreed the Co-ordinator, "but I'd prefer not to have to use it so much. So if you can find some way of handling that little affair on Gull discreetly— Incidentally, since you'll be just a short run then from Lycanno, there's an undesirable political trend reported building up there! They've dropped from D to H-Class politics inside of a decade. You'll find the local Agent's notes on the matter waiting for you on Gull. Perhaps you might as well skip over and fix it."

"All right," said Iliff coldly. "I won't be needed back in my own Zone for another hundred hours. Not urgently."

"Lab's got a new mind-lock for you to test," the Co-ordinator went on briskly. "You'll find that on Gull, too."

There was a slight pause.

"You remember, don't you," the

Agent inquired gently then, as if speaking to an erring child, "what happened the last time I gave one of those gadgets a field test on a high-powered brain?"

"Yes, of course! But if this one *works*," the Co-ordinator pointed out, almost wistfully, "we've got something we really do need. And until I know it does work, under ultimate stresses, I can't give it general distribution. I've picked a hundred of you to try it out." He sighed. "Theoretically, it will hold a mind of any conceivable potential within that mind's own shields, under any conceivable stress, and still permit almost normal investigation. It's been checked to the limit," he concluded encouragingly, "under lab conditions—"

"They all were," Iliff recollected, without noticeable enthusiasm. "Well, I'll see what turns up."

"That's fine!" The Co-ordinator brightened visibly. He added, "we wouldn't, of course, want you to take any *unnecessary* risks—"

For perhaps half a minute after the visualization tank of his telepath transmitter had faded back to its normal translucent and faintly luminous green, Iliff continued to stare into it.

Back on Jeltad, the capitol planet of the Confederacy, fourteen thousand light-years away, the Co-ordinator's attention was turning to some other infinitesimal-seeming but significant crisis in the Department's monstrous periphery. The chances

were he would not think of Iliff again, or of Zone Seventeen Eighty-two, until Iliff's final mission report came in—or failed to come in within the period already allotted it by the Department's automatic monitors.

In either event, the brain screened by the Co-ordinator's conversational inanities would revert once more to that specific problem then, for as many unhurried seconds, minutes or, it might be, hours as it required. It was one of the three or four human brains in the galaxy for which Zone Agent Iliff had ever felt anything remotely approaching genuine respect.

"How far are we from Gull now?" he said without turning his head.

A voice seemed to form itself in the air a trifle above and behind him.

"A little over eight hours, cruising speed—"

"As soon as I get the reports off that pigeon from Jeltad, step it up so we get there in four," Iliff said. "I think I'll be ready about that time."

"The pigeon just arrived," the voice replied. It was not loud, but it was a curiously *big* voice with something of the overtones of an enormous bronze gong in it. It was also oddly like a cavernous amplification of Iliff's own type of speech.

The Agent turned to a screen on his left, in which a torpedolike twenty-foot tube of metal had appeared, seemingly suspended in space and spinning slowly about its axis. Actually, it was some five miles from

the ship—which was as close as it was healthy to get 'to a homing pigeon at the end of its voyage—and following it at the ship's exact rate of speed, though it was driven by nothing except an irresistible urge to get to its "roost," the pattern of which had been stamped in its molecules. The roost was on Iliff's ship, but the pigeon would never get there. No one knew just what sort of subdimensions it flashed through on its way to its objective or what changes were wrought on it before it reappeared, but early experiments with the gadget had involved some highly destructive explosions at its first contact with any solid matter in normal space.

So now it was held by barrier at a safe distance while its contents were duplicated within the ship. Then something lethal flickered from the ship to the pigeon and touched it; and it vanished with no outward indication of violence.

For a time, Iliff became immersed in the dossiers provided both by Interstellar and his own department. The ship approached and presently drove through the boundaries of Zone Seventeen Eighty-two, and the big voice murmured:

"Three hours to Gull."

"All right," Iliff said, still absently. "Let's eat."

Nearly another hour passed before he spoke again. "Send her this. Narrow-beam telepath—Gull itself should be close enough, I think. If you can get it through—"

He stood up, yawned, stretched and bent, and straightened again.

"You know," he remarked suddenly, "I wouldn't be a bit surprised if the old girl wasn't so wacky, after all. What I mean is," he explained, "she really might *need* a Zone Agent!"

"Is it going to be another unpredictable mission?" the voice inquired.

"Aren't they always—when the man picks them for us? What was *that*?"

There was a moment's silence. Then the voice told him, "She's got your message. She'll be expecting you."

"Fast!" Iliff said approvingly. "Now listen. On Gull, we shall be old Trader Casselmath with his stock of exotic and expensive perfumes. So get yourself messed up for the part—but don't spill any of the stuff, this time!"

The suspect's name was Deel. For the past ten years he had been a respected—and respectable—citizen and merchant of the mono-planet System of Gull. He was supposed to have come there from his birthplace, Number Four of the neighboring System of Lycanno.

But the microstructural plates the operative made of him *proved* he was the pirate Tahmey who, very probably, had once been a middling big shot among the ill-famed Ghant Spacers. The Bureau of Interstellar Crime had him on record; and it was a dogma of criminology that

microstructural identification was final and absolute—that the telltale patterns could not be duplicated, concealed, or altered to any major degree without killing the organism.

The operative's people, however, were telepaths, and she was an adept, trained in the widest and most intensive use of the faculty. For a Lannai it was natural to check skeptically, in her own manner, the mechanical devices of another race.

If she had not been an expert she would have been caught then, on her first approach. The mind she attempted to tap was guarded.

By whom or what was a question she did not attempt to answer immediately. There were several of these watchdogs, of varying degrees of ability. Her thought faded away from the edge of their watchfulness before their attention was drawn to it. It slid past them and insinuated itself deftly through the crude electronic thought-shields used by Tahmey. Such shields were a popular commercial article, designed to protect men with only an average degree of mental training against the ordinary telepathic prowler and entirely effective for that purpose. Against her manner of intrusion they were of no use at all.

But it was a shock to discover then that she was in no way within the mind of Tahmey! This was, in literal fact, the mind of the man named Deel—for the past ten years a citizen of Gull, before that of the neighboring System of Lycanno.

The fact was, to her-at least, quite

as indisputable as the microstructural evidence that contradicted it. This was not some clumsily linked mass of artificial memory tracts and habit traces, but a living, matured mental personality. It showed few signs of even as much psychosurgery as would be normal in a man of Deel's age and circumstances.

But if it *was* Deel, why should anyone keep a prosperous, reasonably honest and totally insignificant planeteer under telepathic surveillance? She considered investigating the unknown watchers, but the aura of cold, implacable alertness she had sensed in her accidental near-contact with them warned her not to force her luck too far.

"After all," she explained apologetically, "I had no way of estimating their potential."

"No," Iliff agreed, "you hadn't. But I don't think that was what stopped you."

The Lannai operative looked at him steadily for a moment. Her name was Pagadan and, though no more human than a jellyfish, she was to human eyes an exquisitely designed creature. It was rather startling to realize that her Interstellar dossier described her as a combat-type mind—which implied a certain ruthlessness, at the very least—and also that she had been sent to Gull to act, among other things, as an executioner.

"Now what did you mean by that?" she inquired, on a note of friendly wonder.

"I meant," Iliff said carefully,

"that I'd now like to hear all the little details you didn't choose to tell Interstellar. Let's start with your trip to Lycanno!"

"Oh, I see!" Pagadan said. "Yes, I went to Lycanno, of course—" She smiled suddenly and became with that, he thought, extraordinarily beautiful, though the huge silvery eyes with their squared black irises, which widened or narrowed flickeringly with every change of mood or shift of light, did not conform exactly to any standard human ideal. No more did her hair, a silver-shimmering fluffy crest of something like feathers—but the general effect, Iliff decided, remained somehow that of a remarkably attractive human woman in permanent fancy dress. According to the reports he'd studied recently, it had pleased much more conservative tastes than his own.

"You're a clever little man, Zone Agent," she said thoughtfully. "I believe I might as well be frank with you. If I'd reported everything I know about this case—though for reasons I shall tell you I really found out very little—the Bureau would almost certainly have recalled me. They show a maddening determination to see that I shall come to no harm while working for them." She looked at him doubtfully. "You understand that, simply because I'm a Lannai, I'm an object of political importance just now?"

Iliff nodded.

"Very well. I discovered in Lycanno that the case *was* a little more

than I could handle alone!" She shivered slightly, the black irises flaring wide with what was probably reminiscent fright.

"But I did not want to be recalled. My people," she said a little coldly, "will accept the proposed alliance only if they are to share in your enterprises and responsibilities. They do not wish to be shielded or protected, and it would have a poor effect on them if they learned that we, their first representatives among you, had been relieved of our duties whenever they threatened to involve us in personal danger!"

"I see," Iliff said seriously, remembering that she was royalty of a sort, or the Lannai equivalent of it. He shook his head. "The Bureau," he said, "must have quite a time with you!"

Pagadan stared and laughed. "No doubt they find me a little difficult at times. Still, I *do* know how to take orders! But in this case it seemed more important to make sure I was not going to be protected again than to appear reasonable and cooperative. So I made use, for the first time, of my special status in the Bureau and insisted that a Zone Agent be sent here. However, I can assure you that the case has developed into an undertaking that actually will require a Zone Agent's peculiar abilities and equipment!"

"Well," Iliff shrugged, "it worked and here I am, abilities, equipment and all. What was it you found on Lycanno?"

There was considerable evidence

to show that, during the years Tahmey was on record as having been about his criminal activities in space, the man named Deel was living quietly on the fourth planet of the Lycanno System, rarely even venturing beyond its atmospheric limits because of a pronounced and distressing liability to the psychosis of space-fear.

Pagadan gathered this evidence partly from official records, partly and in much greater detail from the unconscious memories of some two hundred people who had been more or less intimately connected with Deel. The investigation appeared to establish his previous existence in Lycanno beyond all reasonable doubt. It did nothing to explain why it should have become merged fantastically with the physical appearance of the pirate Tahmey.

This Deel was remembered as a big, blond, healthy man, good-natured and shrewd, the various details of his features and personality blurred or exaggerated by the untrained perceptions of those who remembered him. The description, particularly after this lapse of time, could have fitted Tahmey just as well— or just as loosely.

It was as far as she could go along that line. Officialdom was lax in Lycanno, and the precise identification of individual citizens by micro-structural images or the like was not practiced. Deel had been born there, matured there, become reasonably successful. Then his business was destroyed by an offended competitor,

and it was indicated to him that he would not be permitted to re-establish himself in the System.

He had business connections on Gull; and after undergoing a lengthy and expensive conditioning period against the effects of space-fear, he ventured to make the short trip, and was presently working himself back to a position comfortably near the top on Gull.

That was all. Except that—somewhere along the line—his overall physical resemblance to Tahmey had shifted into absolute physical identity . . .

"I realize, of course, that the duplication of a living personality in another body is considered almost as impossible as the existence of a microstructural double. But it does seem that Tahmey-Deel has to be one or the other!"

"Or," Iliff grunted, "something we haven't thought of yet. This is beginning to look more and more like one of those cases I'd like to forget. Well, what did you do?"

"If there was a biopsychologist in the Lycanno System who had secretly developed a method of personality transfer in some form or other, he was very probably a man of considerable eminence in that line of work. I began to screen the minds of persons likely to know of such a man."

"Did you find him?"

She shook her head and grimaced uncomfortably. "He found me—at least, I think we can assume it was he! I assembled some promising

leads, a half dozen names in all, and then—I find this difficult to describe—from one moment to another I knew I was being . . . sought . . . by another mind. By a mind of quite extraordinary power, which seemed fully aware of my purpose, of the means I was employing—in fact, of everything except my exact whereabouts at the moment. It was intended to shock me into revealing that—simply by showing me, with that jolting abruptness, how very close I stood to being caught!"

"And you didn't reveal yourself?"

"No," she laughed nervously. "But I went 'akaba' instead! I was under it for three days and well on my way back to Gull when I came out of it—as a passenger on a com-



mercial ship! Apparently, I had abandoned my own ship on Lycanno and conducted my escape faultlessly and without hesitation. Successfully, at any rate— But I remember nothing, of course!”

“That was quite a Brain chasing you then!” Iliff nodded slowly. The akaba condition was a disconcerting defensive trick which had been played on him on occasion by members of other telepathic races. The faculty was common to most of them; completely involuntary, and affected the pursuer more or less as if he had been closing in on a glow of mental light and suddenly saw that light vanish without a trace.

The Departmental Lab's theory was that under the stress of a psychic attack which was about to overwhelm the individual telepath, a kind of racial Overmind took over automatically and conducted its member-mind's escape from the emergency, if that was at all possible, with complete mechanical efficiency before restoring it to awareness of itself. It was only a theory since the Overmind, if it existed, left no slightest traces of its work—except the brief void of one of the very few forms of complete and irreparable amnesia known. For some reason, as mysterious as the rest of it, the Overmind never intervened if the threatened telepath had been physically located by the pursuer.

They stared at each other thoughtfully for a moment, then smiled at the same instant.

“Do you^e believe now,” Pagadan challenged, “that this task is worthy of the efforts of a Vegan Zone Agent and his shipload of specialists?”

“I've been afraid of that right along,” Iliff said without enthusiasm. “But look, you seem to know a lot more about Galactic Zones than you're really supposed to. Like that business about our shipload of specialists—that kind of information is to be distributed only 'at or above Zone Agent levels.' Where did you pick it up?”

“On Jeltad—above Zone Agent levels,” Pagadan replied undisturbed. “Quite a bit above, as a matter of fact! The occasion was social. And now that I've put you in your place when do you intend to investigate Deel? I've become casually acquainted with him and could arrange a meeting at almost any time.”

Iliff rubbed his chin. “Well, as to that,” he said, “Trader Casselmath dropped in to see a few of Deel's business associates immediately after landing today. They were quite fascinated by the samples of perfume he offered them—he does carry an excellent line of the stuff, you know, though rather high-priced. So Deel turned up too, finally. You'll be interested to hear he's using a new kind of mind-shield now.”

She was not surprised. “They were warned, naturally, from Lycanno. The mentality there knew I had been investigating Deel.”

"Well, it shows the Brain wasn't able to identify you too closely, because they're waiting for you to pick up your research at this end again! The shield was hair-triggered to give off some kind of alarm. Old Casselmath couldn't be expected to recognize that, of course! He took a poke at it, innocently enough—just trying to find out how far Deel and company could be swindled."

She leaned forward, eyes gleaming black with excitement. "What happened?"

Iloff shrugged. "Nothing at all obvious. But somebody did come around almost immediately to look Casselmath over. In fact, they pulled his simple mind pretty well wide open, though the old boy never noticed it. Then they knew he was harmless and went away."

Pagadan frowned faintly.

"No," Iloff said, "it wasn't the Brain! These were stooges, though clever ones—probably the same that were on guard when you probed Tahmey-Deel the first time. But they've been alerted now, and I don't think we could do any more investigating around Deel without being spotted. After your experience on Lycanno, it seems pretty likely that the answers are all there, anyway."

She nodded slowly. "That's what I think. So we go to Lycanno!"

Iloff shook his head. "Just one of us goes," he corrected her. And before her flash of resentment could

be voiced he added smoothly, "That's for my own safety as much as for yours. The Brain must have worked out a fairly exact pattern of your surface mentality by now; you couldn't get anywhere near him without being discovered. If we're together, that means I'm discovered, too!"

She thought it over, shrugged very humanly and admitted, "I suppose you're right. What am I to do?"

"You're to keep a discreet watch—a very discreet watch—on Deel and his guardians! How Deel manages to be Tahmey, or part of him, at the same time is something the Brain's going to have to explain to us; and if he has a guilty conscience, as he probably has, he may decide to let the evidence disappear. In that case, try to keep a line on where they take Deel—but don't, under any circumstances, take any direct action until I get back from Lycanno."

The black-and-silver eyes studied him curiously. "Isn't that likely to be quite a while?" Pagadan inquired—with such nice control that he almost overlooked the fact that this politically important nonhuman hothead was getting angry again.

"From what we know now of the Brain, he sounds like one of our tougher citizens," he admitted. "Well, yes . . . I might be gone all of two days!"

There was a moment of rather tense silence. Then Iloff murmured approvingly:

"See now! I just *knew* you could brake down on that little old temperament!"

The Lannai released her breath. "I only hope you're half as good as you think," she said weakly. "But I am almost ready to believe you will do it in two days."

"Oh, I will," Iliff assured her, "with my shipload of specialists." He stood up and looked down at her unsmiling. "So now if you'll give me the information you gathered on those top biopsychologists in Lycanno, I'll be starting."

She nodded amiably. "There are two things I should like to ask you though, before you go. The one is—why have you been trying to probe through my mind-shields all evening?"

"It's a good thing to find out as much as you can about the people you meet in this business," Iliff said without embarrassment. "So many of them aren't really nice. But your shields are remarkably tough. I got hardly any information at all."

"You got nothing!" she said flatly, startled into contradiction.

"Oh, yes. Just a little—when you were giving me that lecture about the Lannai being a proud people and not willing to be protected, and all that. For a moment there you were off guard—"

He brought the captured thought slowly from his mind: the picture of a quiet, dawnlit city—seas of sloping, ivory-tinted roofs, and

towers slender against a flaming sky.

"That is Lar-Sancaya the Beautiful—my city, my home-planet," Pagadan said. "Yes, that was my thought. I remember it now!" She laughed. "You *are* a clever little man, Zone Agent! What information was in that for you?"

Iliff shrugged. He still showed the form of old Casselmath, the fat, unscrupulous little Terran trader whose wanderings through the galaxy coincided so often with the disappearance of undesirable but hitherto invulnerable citizens, with the inexplicable diversion of belligerent political trends, and the quiet toppling of venal governments. A space-wise, cynical, greedy but somehow ridiculous figure. Very few people ever took Casselmath seriously.

"Well, for one thing that the Lannai are patriots," he said gloomily. "That makes them potentially dangerous, of course. On the whole, I'm rather glad you're on our side."

She grinned cheerfully. "So am I—on the whole. But now, if you'll forgive a touch of malice, which you've quite definitely earned, I'd like the answer to my second question. And that is—what sent that little shock through your nerves when I referred to Tahmey's probable connection with the Ghant Spacers a while ago?"

Old Casselmath rubbed the side of his misformed nose reflectively.

"It's a long, sad story," he said.

"But if you want to know—some years back, I set out to nail down the boss of that outfit, the great U-1, no less! That was just after the Confederacy managed to break up the Ghant fleet, you remember—Well, I finally thought I'd got close enough to him to try a delicate probe at his mind—ugh!"

"I gather you bounced!"

"Not nearly fast enough to suit me. The big jerk knew I was after him all the time, and he'd set up a mind-trap for me. Mechanical and highly powered! I had to be helped out of it, and then I was psychoed for six months before I was fit to go back to work.

"That was a long time ago," Caselmath concluded sadly. "But when it comes to U-1, or the Ghant Spacers, or anything at all connected with them, I've just never been the same since!"

Pagadan studied her shining nails and smiled sweetly.

"Zone Agent Iliff, I shall bring you the records you want—and you may then run along! From now on, of course, I know exactly what to do to make you *jump!*"

He sat bulky and expressionless at his desk, raking bejeweled fingers slowly through his beard—a magnificent, fan-shaped beard, black, glossy and modishly curled. His eyes were as black as the beard but so curiously lusterless he was often thought to be blind.

For the first time in a long, long

span of years, he was remembering the meaning of fear.

But the alien thought had not followed him into the Dome—at least, he could trust his protective devices here! He reached into a section of the flowing black outer garments he wore, and produced a silvery, cone-shaped device. Placing the little amplifier carefully on the desk before him, he settled back in his chair, crossed his hands on his large stomach and half closed his eyes.

Almost immediately the recorded nondirectional thought impulses began. So faint, so impersonal, that even now when he could study their modified traces at leisure, when they did not fade away the instant his attention turned to them, they defied analysis except of the most general kind. And yet the unshielded part of his mind had responded to them, automatically and stupidly, for almost an hour before he realized—

Long enough to have revealed—almost anything!

The gems on his hand flashed furious fire as he whipped the amplifier off the desk and sent it smashing against the wall of the room. It shattered with a tinny crackle and dropped to the floor where a spray of purple sparks popped hissing from its crumpled surfaces and subsided again. The thought-impulses were stilled.

The black-bearded man glared down at the broken amplifier. Then, by almost imperceptible degrees, his

expression began to change. Presently, he was laughing silently.

No matter how he had modified and adapted this human brain for his purpose, it remained basically what it had been when he first possessed himself of it! Whenever he relaxed his guidance, it reverted automatically to the old levels of emotional reaction.

He had forced it to develop its every rudimentary faculty until its powers were vastly superior to those of any normal member of its race. No ordinary human being, no matter how highly gifted, could be the equal of one who had had the advantage of becoming host-organism to a parasitizing Ceetal! Not even he, the Ceetal, himself was in any ordinary way the equal of this hypertrophied human intellect—he only controlled it. As a man controls a machine he has designed to be enormously more efficient than himself—

But if he had known the human breed better, he would have selected a more suitable host from it, to be gin with. At its best, this one had been a malicious mediocrity; and its malice only expanded with its powers so that, within the limits he permitted, it now used the mental equipment of a titan to pamper the urges of an ape. A scowling moron who, on the invisible master's demand, would work miracles! Now, at the first suggestion that its omnipotence might be threatened, it turned guilt-ridden and panicky,

vacillating between brute fright and brute rages.

Too late to alter that—he was linked to his slave for this phase of his life-cycle! For his purposes, the brute was at any rate adequate, and it often amused him to observe its whims. But for the new Ceetals—for those who would appear after his next Change—he could and would provide more suitable havens!

One of them might well be the spy who had so alarmed his human partner! The shadowy perfection of his mental attack in itself seemed to recommend him for the role.

Meanwhile, however, the spy still had to be caught.

In swift waves of relaxation, the Ceetal's influence spread through the black-bearded man's body and back into the calming brain. His plan was roughly ready, the trap for the spy outlined, but his human thought-machine was infinitely better qualified for such work.

Controlled now, its personal fears and even the memory of them neutralized, it took up the problem as a problem—swept through it, clarifying, developing, concluding:

It was quite simple. The trap for this spy would be baited with the precise information he sought. On Gull, meanwhile, Tahmey remained as physical bait for the other spy, the first one—the nonhuman mind which had escaped by dint of the instantaneous shock-reflex that plucked it from his grasp as he prepared to close in. That the two were collaborating

was virtually certain, that both were emissaries of the Confederacy of Vega was a not too unreasonable conjecture. No other organization suspected of utilizing combat-type minds of such efficiency was also likely to be interested in the person of Tahmey!

He was not, of course, ready to defy the Confederacy as yet—would not be for some time. A new form of concealment for Tahmey might therefore be necessary. But with the two spies under control, with the information extracted from them, any such difficulties could easily be met.

The black-bearded man's hands began to move heavily and unhurriedly over the surface of the desk, activating communicators and recorders.

The plan took shape in a pattern of swift, orderly arrangements.

Four visitors were waiting for him when he transferred himself to the principal room of the Dome—three men and a woman of the tall, handsome Lycannese breed. The four faces turning to him wore the same expression, variously modified, of arrogant impatience.

These and a few others, to all of whom the black-bearded man was known simply as the Psychologist, had considered themselves for a number of years to be the actual, if unknown, rulers of the Lycannese System. They were very nearly right.

At his appearance, two of them

began to speak almost simultaneously.

But they made no intelligible sound.

Outwardly, the black-bearded man had done nothing at all. But the bodies of the four jerked upright in the same instant, as if caught by a current of invisible power. They froze into that attitude, their faces twisted in grotesque terror, while his heavy-lidded, sardonic eyes shifted from one to the other of them.

"Must it always affect you like *that*," he said in friendly reproach, "to realize what I actually am? Or do you feel guilty for having planned to dispose of me, as a once-useful inferior who can no longer further your ambitions?" He paused and studied them again in turn, and the pleasantness went out of his expression.

"Yes, I knew about that little plot," he announced, settling his bulk comfortably on a low couch against the wall. He looked critically at his fingernails. "Normally, I should simply have made its achievement impossible, without letting you find out what had gone wrong. But as things stand, I'm afraid I shall be obliged to dispense with you entirely. I regret it, in a way. Our association has been a useful and amusing one—to me, at least! But, well—"

He shook his head.

"Even I make mistakes!" he admitted frankly. "And recent events have made it clear that it was a

mistake to involve somewhat ordinary human beings as deeply in my experiments and plans as I involved you—and also that companion of yours, whose absence here may have caused you to speculate. He,” the Psychologist explained good-naturedly, “will outlive you by a day or so!” He smiled. “Oddly enough, his brief continued usefulness to me is due to the fact that he is by far the least intelligent of you—so that I had really debated the advisability of dropping him from our little circle before this!”

His smile broadened invitingly, but he showed no resentment when none of the chalk-faced, staring puppets before him joined in his amusement.

“Well,” he beamed, “enough of this! There are minds on our track who seem capable of reaching you through any defense I can devise. Obviously, I cannot take that risk! Your friend, however, will live long enough to introduce me to one of these minds—another one of your ever-surprising species—who should eventually be of far greater value to me than any of you could hope to be. Perhaps even as valuable as the person you know as Tahmey! Let that thought console you in your last moments—which,” he concluded, glancing at a pearly oblong that was acquiring a shimmering visibility in the wall behind the four Lycannese, “are now at hand!”

Two solidly built men came into the room through the oblong, saluted, and waited.

The black-bearded one gave them a genial nod and jerked his thumb in the general direction of the motionless little group of his disposed associates.

“Strangle those four,” he said, “in turn—”

He looked on for a few moments but then grew bored. Rising from the couch, he walked slowly toward one of the six walls of the room. It began to turn transparent as he approached, and when he stood before it the port-city of Lycanno IV, the greatest city in the Lycannese System, was clearly visible a few thousand feet below.

He gazed down at the scene almost affectionately, savoring a mood of rich self-assurance. For he was, as he had just now proved once more, the city’s absolute master—master of the eight million human beings who lived there; of the two billion on the planet; of the sixteen billion in the System. Not for years had his mastery been seriously challenged!

His lusterless black eyes shifted slowly to Lycanno’s two suns, moving now toward their evening horizon. Scattered strategically through the galaxy, nearly a thousand such suns lighted as many planetary systems, each of which was being gathered slowly into a Ceetal’s grasp. The black-bearded man did not entertain the delusion that Lycanno by itself was an important conquest—no more than each of those other fractional human civilizations. But when the time came finally —

He permitted himself to lapse into a reverie of galactic conquest. But curiously, it was now the human brain and mind which indulged itself in this manner. The parasite remained lightly detached, following the imaginings without being affected by them, alert for some new human foible which it might turn some day to Ceetal profit.

It was, the Ceetal realized again, an oddly complicated organism, the human one! His host fully understood the relationship between them, and his own subordinate part in the Ceetal's plans. Yet he never let himself become conscious of the situation and frequently appeared to feel an actual identity with the parasite. It was strange such a near-maniac species could have gained so dominant a position in this galaxy!

There was a sudden minor commotion in the center of the room, harsh snoring sounds and then a brief, frenzied drumming of heels on the carpeted floor.

"You are getting careless," the Psychologist said coldly, without turning his head. "Such things can be done quietly!"

The small yellow-faced man with the deep-set amber eyes drew a good number of amused and curious stares during the two days he was registered at the Old Lycannese Hotel.

He expected nothing else. Even in such sophisticated and galactic-minded surroundings, his appearance was fantastic to a rather in-

decent degree. The hairless dome of his head sloped down comically into a rounded snout. He was noseless and apparently earless, and in animated moments his naked yellow scalp would twitch vigorously like the flanks of some vermin-bitten beast.

However, the Old Lycannese harbored a fair selection of similarly freakish varieties of humanity within its many-storied walls—mutant humanity from worlds that were, more often than not, only nameless symbols on any civilized star-map. Side by side with them, indistinguishable to the average observer, representatives of the rarer humanoid species also came and went—on the same quest of profitable trade with Lycanno.

The yellow-faced man's grotesqueness, therefore, served simply to classify him. It satisfied curiosity almost as quickly as it drew attention; and no one felt urged to get too sociable with such a freak. Whether mutant human or humanoid, he was, at any rate, solvent and had shown a taste for quiet luxury. The hotel saw that he got what he wanted, pocketed his money and bothered its managerial head no further about him.

This curiosity-distracting effect, the yellow-faced man considered, as he strolled across the ground-floor lobby, was almost as satisfactory when it was applied to those who had reason to take a much sharper practical interest in any stranger! Two members of the Psychologist's

bodyguard, behind whom he was heading toward an open elevator which led to the roof-terraces, had scrutinized him swiftly in passing a moment before—but only long enough to re-establish his identity beyond any doubt. They had checked that in detail the previous day—a Talpu, Humanoid, from a system of the Twenty-eighth Median Cluster, dealing in five varieties of gems—three of them previously unknown to Lycanno. Queer-looking little duck, but quite harmless.

The Psychologist's bodyguard took few chances, but they were not conditioned to look for danger in so blatantly obvious a shape.

The Psychologist himself, whose dome-shaped dwelling topped one section of the Old Lycannese Hotel, was taking no chances at all these days. From the center of the moving cluster of his henchmen he gave the trailing humanoid's mind a flicking probe and encountered a mind-shield no different than was to be expected in a traveler with highly valuable commercial secrets to preserve—a shield he could have dissolved in an instant with hardly any effort at all.

However, so sudden an operation would have entailed leaving a small yellow maniac gibbering in agony on the floor of the lobby behind him—a complication he preferred to avoid in public. He dropped the matter from his thoughts, contemptuously. He knew of the Talpu—a base, timid race, unfit even for slavery.

A secondary and very different shield, which the more obvious first one had concealed from the Psychologist's probe, eased cautiously again in the yellow-faced man's mind, while the Talpu surface thoughts continued their vague quick trceries over both shields, unaffected either by the probe or by the deeper reaction it had aroused.

As the Psychologist's group reached the automatic elevator, the humanoid was almost side by side with its rearmost members and only a few steps behind the dignitary himself. There the party paused briefly while one of the leading guards scanned the empty compartment, and then stood aside to let the Psychologist enter. That momentary hesitation was routine procedure. The yellow-faced man had calculated with it, and he did not pause with the rest—though it was almost another half-second before any of the Psychologist's watch-dogs realized that *something* had just passed with a shadowy unobtrusiveness through their ranks.

By then, it was much too late. The great man had just stepped ponderously into the elevator; and the freakish little humanoid, now somehow directly behind him, was entering on his heels.

Simultaneously, he performed two other motions, almost casually.

As his left hand touched the switch that started the elevator on its way to the roof, a wall of impalpable force swung up and out-

wards from the floor-sill behind him, checking the foremost to hurl themselves at this impossible intruder—much more gently than if they had run into a large feather cushion but also quite irresistibly. The hotel took no chances of having its patrons injured on its premises; so the shocked bodyguards simply found themselves standing outside the elevator again before they realized it had flashed upward into its silvery shaft.

As it began to rise, the yellow-faced man completed his second motion. This was to slip a tiny hypodermic needle into the back of the Psychologist's neck and depress its plunger.

One could not, of course, openly abduct the system's most influential citizen without arousing a good deal of hostile excitement. But he had, Iliff calculated, when the elevator stopped opposite his apartments near the top of the huge hotel, a margin of nearly thirty seconds left to complete his getaway before any possible counterattack could be launched. There was no need to hurry.

A half dozen steps took him from the elevator into his rooms, the Psychologist walking behind him with a look of vague surprise on his bearded face. Another dozen steps brought the two out to an open-air platform where a rented fast plane-car was waiting.

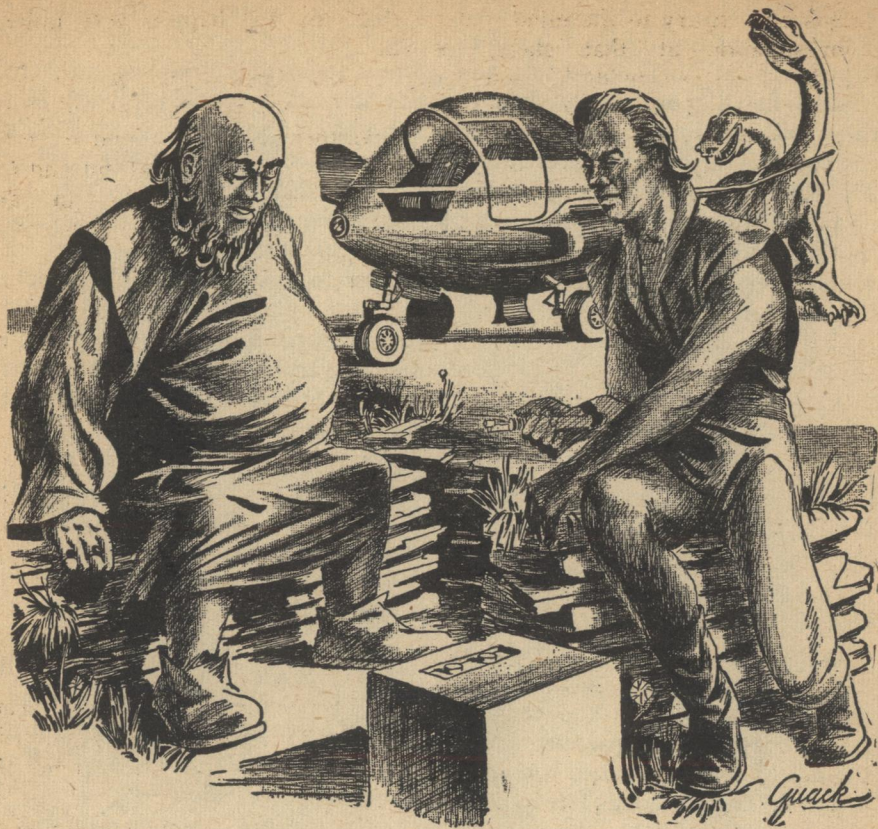
At sixty thousand feet altitude, Iliff checked the spurt of their vertical ascent and turned north. The

land was darkening with evening about the jewellike sparkle of clustered seaboard cities, but up here the light of Lycanno's primary sun still glittered greenly from the car's silver walls. The speeding vehicle was shielded for privacy from all but official spy-rays, and for several more minutes he would have no reason to fear those. Meanwhile, any aerial pursuer who could single him out from among the myriad similar cars streaming into and out of the port city at that hour would be very good indeed.

Stripping the vivo-gel masks carefully from his head and hands, he dropped the frenziedly twitching half-alive stuff into the depository beside his seat where the car's jets would destroy it.

The Psychologist sat, hunched forward and docile, beside him—dull black eyes staring straight ahead. So far, the new Vegan mind-lock was conforming to the Third Coordinator's expectations.

Interrogation of the prisoner took place in a small valley off the coast of an uninhabited island, in the sub-polar regions. A dozen big snake-necked carnivores scattered from the carcass of a still larger thing on which they had been feeding as the plane-car settled down; and their snuffing and baffled howls provided a background for the further proceedings which Iliff found grimly fitting. He had sent out a fear-impulse adjusted to the beast-pack's primitive sensation-level, which kept



them prowling helplessly along the rim of a hundred-yard circle.

In the center of this circle Iliff sat cross-legged on the ground, watching the Quizzer go about its business.

The Quizzer was an unbeautiful two-foot cube of machine. Easing itself with delicate ruthlessness through the Psychologist's mental defenses, it droned its findings step by step into Iliff's mind. He could

have done the work without its aid, since the shield had never been developed that could block a really capable investigator if he was otherwise unhampered. But it would have taken a great deal longer; and at best he did not expect to have more time than he needed to extract the most vital points of information. Besides, he lacked the Quizzer's sensitivity; if he was hurried, there was a definite risk of doing ir-

reparable injury to the mind under investigation—at that stage, he hadn't been able to decide whether or not it would be necessary to kill the Psychologist.

The second time the Quizzer contacted the Ceetal, he knew. The little robot reported an alien form of awareness which came and went through the Quizzer's lines of search as it chose and was impossible to localize.

"It is the dominant consciousness in this subject. But it is connected with the organism only through the other one."

The Quizzer halted again. It was incapable of surprise or confusion, but when it could not classify what it found it stopped reporting. It was bothered, too, by the effects of the mind-lock—an innovation to which it was not adjusted. The chemical acted directly on the shields, freezing those normally flexible defensive patterns into interlocked nets of force which isolated the energy centers of the nervous system that produced them.

"Give me anything you get on it!" Iliff urged.

The machine still hesitated. And then:

"It thinks that if it could break the force you call the mind-lock and energize the organism it could kill you instantly. But it is afraid that it would cause serious injury to the organism in doing so. Therefore it is willing to wait until its friends arrive and destroy you. It is certain

that this will happen very quickly now."

Iliff grunted. That was no news to him, but it gave him an ugly thrill nevertheless. He'd found it necessary to cut his usual hit-and-run tactics very fine for this job; and so far he had got nothing he could use out of it.

"Does this primary consciousness," he inquired, "know what you're trying to do and what you're telling me?"

"It knows what I'm trying to do," the machine responded promptly. "It does not know that I'm telling you anything. It is aware of your presence and purpose but it can receive no sense impression of any kind. It can only think."

"Good enough," Iliff nodded. "It can't interfere with your activity then?"

"Not while the mind-lock keeps it from arousing its energy sources."

"What of the other one—the human consciousness?"

"That one is somnolent and completely helpless. It is barely aware of what is occurring and has made no attempt to interfere. It is only the mind-lock that blocks my approach to the information you require. If you could dissolve that force, there would be no difficulty."

Iliff wasted a baleful look on his squat assistant. "Except," he pointed out, "that I'd get killed!"

"Undoubtedly," the machine agreed with idiotic unconcern. "The energy centers of this organism are overdeveloped to an extent which,

theoretically, should have drained it of its life-forces many years ago. It appears that the alien consciousness is responsible both for the neural hypertrophy and for the fact that the organism as a whole has been successfully adapted to meet the resultant unnatural stresses—”

Towards the end of the next half-hour, the pattern of information finally began to take definite shape—a shape that made Iliff increasingly anxious to get done with the job. But which showed also that the Third Co-ordinator’s hunch had been better than he knew!

Lycanno was long overdue for a Zone Agent’s attentions.

He should, he supposed, have been elated; instead, he was sweating and shivering, keyed to nightmarish tensions. Theoretically, the mind-lock might be unbreakable, but the Ceetal, for one, did not believe it. It did fear that to shatter lock and shields violently might destroy its host and thereby itself; so far, that had kept it from making the attempt. That, and the knowledge it shared with its captor—that they could not remain undiscovered much longer.

But at each new contact, the Quizzer unemotionally reported an increase in the gathering fury and alarm with which the parasite observed the progress of the investigation. It had been coldly contemptuous at first; then the realization came slowly that vital secrets *were* being drawn, piece by piece, from the drugged human mind to which it

was linked—and that it could do nothing to check the process!

By now, it was dangerously close to utter frenzy, and for many minutes Iliff’s wrist-gun had been trained on the hunched and motionless shape of the Psychologist. Man and Ceetal would die on the spot if necessary. But even in its death-spasms, he did not want to be in the immediate neighborhood of that mind and the powers it could unleash if it broke loose. Time and again, he drew the Quizzer back from a line of investigation that seemed too likely to provide the suicidal impulse. Other parts of the pattern had been gained piecemeal, very circumstantially.

It was tight, carefully balanced work. However, there were only a few more really important points left now. There might be just time enough—

Iliff jerked upright as a warning blared from an automatic detector he had installed in the planecar the day before, raising a chorus of furious carnivore yells from the rim of the hundred-yard fear-circle.

“Two planetary craft approaching at low cruising speeds,” it detailed. “Sector fourteen, distance eighty-five miles, altitude nineteen miles. Surface and psyche scanners are being used.”

And, an instant later:

“You have been discovered!”

The rescuers were several minutes earlier than he’d actually expected. But the warning gave him the exact margin required for his next action,

and the uncertainty and tension vanished from his mind.

He snapped a command to the Quizzer:

"Release the subject—then destroy yourself!"

Freed from invisible tentacles, the Psychologist's body rolled clumsily forward to the turf, and at once came stumbling to its feet. Behind it, the Quizzer flared up briefly in a shower of hissing sparks, collapsed, liquefied, and fused again into metallic formlessness.

Seconds later, Iliff had lifted the planecar over the valley's tree-top level. The vehicle's visiglobe was focused locally—every section of the dark little valley appeared as distinct in it as if flooded with brilliant daylight. Near its center, the figure of the Psychologist was groping through what to him was near-complete blackness down into the open ground. Whether the alien mind understood that its men had arrived and was attempting to attract their attention, Iliff would never know.

It did not matter, now. The planecar's concealed guns were trained on that figure; and his finger was on the trigger-stud.

But he did not fire. Gliding out from under the trees, the lean, mottled shapes of the carnivore-pack had appeared in the field of the globe. Forgetting the intangible barrier of fear as quickly as it ceased to exist, they scuttled back toward their recently abandoned feast—and swerved, in a sudden new awareness,

to converge upon the man-form that stumbled blindly about near it.

Iliff grimaced faintly, spun the visiglobe to wide-range focus and sent the planecar hurtling over the shoreline into the sea. The maneuver would shield him from the surface scanners of the nearest pursuers and give him a new and now urgently needed headstart.

It would please his scientific colleagues back on Jeltad, he knew, to hear that the Ceetal had been mistaken about the strength of their mind-lock! For the brief seconds it survived in the center of the ravening mottled pack, that malevolent intellect must have put forth every effort to break free and destroy its attackers.

It had been quite unsuccessful.

Near dawn, in the fifth-largest city of Lycanno IV, a smallish military gentleman proceeded along the docks of a minor space port towards a large, slow-looking, but apparently expensive craft he had registered there two days before. Under one arm he carried a bulging brief case of the openly spy-proof type employed by officials of the Terran embassy.

The burden did not detract in the least from his air of almost belligerent dignity—an attitude which still characterized most citizens of ancient Earth in the afterglow of her glory. The ship he approached was surrounded by a wavering, globular sheen of light, like a cluster of multiple orange halos, warning dock at-

tendants and the idly curious from coming within two hundred feet of it.

Earthmen were notoriously jealous of their right to privacy.

The military gentleman, whose size was his only general point of resemblance to either Iliff or the yellow-faced man who had been a guest of the Old Lycannese Hotel not many hours earlier, walked into the area of orange fire without hesitation. From the ship, a brazen, inhuman voice boomed instantly at him, both audibly and in-mental shock-waves that would have rocked the average intruder back like a blow in the face:

"Withdraw at once! This vessel is shielded from investigation in accordance with existing regulations. Further unauthorized advance into the area defined by the light-barrier—"

The voice went silent suddenly. Then it continued, subvocally:

"You are being observed from a strato-station. Nothing else to report. We can leave immediately."

In the strato-station, eighty miles above, a very young, sharp-faced fleet lieutenant was turning to his captain:

"Couldn't that be—?"

The captain gave him a sardonic, worldly-wise smile.

"No, Junior," he said mildly, "that could not be. That, as you should recall, is Colonel Perritaph, recently attached to the Terran Military Commission. We checked him through this port yesterday morn-

ing. But," he added, "we're going to have a little fun with the colonel. As soon as he's ready to take off, he'll drop that light-barrier. When he does, spear him with a tractor and tell him he's being held for investigation, because there's a General Emergency out!"

"Why not do it now? Oh!"

"You catch on, Junior—you do catch on!" his superior approved tolerantly. "No light-barrier is to be monkeyed with, ever! Poking a tractor-beam into one *may* do no harm. On the other hand, it may blow up the ship, the docks, or, just possibly, our cozy little station up here—all depending on what stuff happens to be set how! But once the colonel's inside and has the crate under control, he's not going to blow up anything, even if we do hurt his tender Terran feelings a bit."

"That way we find out what he's got in the ship, diplomatic immunity or not," the lieutenant nodded, trying to match the captain's air of weary omniscience.

"We're not interested in what's in the ship," the captain said softly, abashing him anew. "Terra's a couple of hundred years behind us in construction and armaments—always was!" This was not strictly true; but the notion was a popular one in Lycanno, which had got itself into a brief, thunderous argument with the aging Mother of Galactic Mankind five hundred years before and limped for a century and a half thereafter. The unforeseen outcome had, of course, long since

been explained—rotten luck and Terran treachery—and the whole regrettable incident was not often mentioned nowadays.

But, for a moment, the captain glowered down in the direction of the distant spaceport, unaware of what moved him to malice.

"We'll just let him squirm around a bit and howl for his rights," he murmured. "They're so beautifully sensitive about those precious privileges!"

There was a brief pause while both stared at the bulky-looking ship in their globe.

"Wonder what that G.E. really went out for," the lieutenant ventured presently.

"To catch one humanoid ape—as described!" the captain grinned. Then he relented. "I'll tell you one thing—it's big enough that they've put out the Fleet to blast anyone who tries to sneak off without being identified!"

The lieutenant tried to look as if that explained it, but failed. Then he brightened and announced briskly: "The guy's barrier just went off!"

"All right. Give him the tractor!"

"It's—"

Up from the dock area then, clearly audible through their instruments, there rose a sound: a soft but tremendous *WHOOSH!* The cradle in which the slow-looking ship had rested appeared to quiver violently. Nothing else changed. But the ship was no longer there.

In white-faced surprise, the lieu-

tenant goggled at the captain. "Did . . . did it blow up?" he whispered.

The captain did not answer. The captain had turned purple, and seemed to be having the worst kind of trouble getting his breath.

"Took off—*under space-drive!*" he gasped suddenly. "How'd he do that without wrecking— With a tractor on him!"

He whirled belatedly, and flung himself at the communicators. Gone was his aplomb, gone every trace of worldly-wise weariness.

"Station 1222 calling Fleet!" he yelped. "Station 1222 calling—"

While Lycanno's suns shrank away in the general-view tank before him, Iliff rapidly sorted the contents of his brief case into a small multiple-recorder. It had been a busy night—to those equipped to read the signs the Fourth Planet must have seemed boiling like a hive of furious bees before it was over! But he'd done most of what had seemed necessary, and the pursuit never really got within minutes of catching up with him again.

When the excitement died down, Lycanno would presently discover it had become a somewhat cleaner place overnight. For a moment, Iliff wished he could be around when the real Colonel Perritaph began to express his views on the sort of police inefficiency which had permitted an impostor to make use of *his* name and position in the System.

Terra's embassies were always ready to give a representative of the

Confederacy a helping hand, and no questions asked; just as, in any all-out war, its tiny, savage fleet was regularly found fighting side by side with the ships of Vega—though never exactly together with them. Terra was no member of the Confederacy; it was having no foreigners determine its policies. On the whole, the Old Planet had not changed so very much.

When Iliff set down the empty brief case, the voice that had addressed him on his approach to the ship spoke again. As usual, it was impossible to say from just where it came; but it seemed to boom out of the empty air a little above Iliff's head. In spite of its curious resemblance to his own voice, most people would have identified it now as the voice of a robot.

Which it was—for its size the most complicated robot-type the science of Vega and her allies had yet developed.

"Two armed space-craft, Lycannese destroyer-type, attempting interception!" it announced. After the barest possible pause, it added: "Instructions?"

Iliff grinned a little without raising his head. No one else would have noticed anything unusual in the stereotyped warning, but he had been living with that voice for some fifty years.

"Evasion, of course, you big ape!" he said softly. "You'll have had all the fighting you want before you're scrapped!"

His grin widened then, at a very

convincing illusion that the ship had shrugged its sloping and monstrously armored shoulders in annoyed response. That, however, was due simply to the little leap with which the suns of Lycanno vanished from the tank in the abruptness of full forward acceleration.

In effect, the whole ship was the robot—a highly modified version of the deadly one-man strike-ships of the Vegan battle fleet, but even more heavily armed and thus more than qualified to take on a pair of Lycannese destroyers for the split-second maneuverings and decisions, the whole slashing frenzy of a deep-space fight. Its five central brains were constructed to produce, as closely as possible, replicas of Iliff's own basic mental patterns, which made for a nearly perfect rapport. Beyond that, of course, the machine was super-sensed and energized into a truly titanic extension of the man.

Iliff did not bother to observe the whiplash evasion tactics which almost left the destroyers' commanders wondering whether there had been any unidentified spaceship recorded on their plates in the first place. That order was being carried out much more competently than if he had been directing the details himself; and meanwhile there was other business on hand—the part of his job he enjoyed perhaps least of all. A transmitter was driving the preliminary reports of his actions on Lycanno Four across nearly half the galaxy to G.Z. Headquarters Central on the planet of Jeltad.

There, clerks were feeding it, in series with a few thousand other current intermission reports, into more complex multiple-recorders, from which various sections were almost instantaneously disgorged, somewhat cut and edited.

"She has not responded to her personal beam," the robot announced for the second time.

"Sure she just wasn't able to get back at us?"

"There is no indication of that."

"Keep it open then—until she does answer," Iliff said. Personal telepathy at interstellar ranges was always something of an experiment, unless backed at both ends by mechanical amplifiers of much greater magnitude than were at Pagadan's disposal.

"But I do wish," he grumbled, "I'd been able to find out what made the Ceetal so particularly interested in Tahmey! Saving him up, as host, for the next generation, of course. If he hadn't been so touchy on that point—" He scowled at the idly clicking transmitter before him. Deep down in his mind, just on the wrong side of comprehension, something stirred slowly and uneasily and sank out of his awareness again.

"Correlation ought to call in pretty soon," he reassured himself. "With the fresh data we've fed them, they'll have worked out a new line on the guy."

"Departmental Lab is now attempting to get back on transmitter," the robot informed him. "Shall I

blank them out till you've talked with Correlation?"

"Let them through," Iliff sighed. "If we have to, we'll cut them off—"

A staccato series of clicks conveying an impression of agitated inquiry, rose suddenly from the transmitter. Still frowning, he adjusted light-scales, twisted knobs, and a diminutive voice came gushing in mid-speech from the instrument. Iliff listened a while; then he broke in impatiently.

"Look," he explained, "I've homed you the full recorded particulars of the process they used! You'll have the stuff any minute now, and you'll get a lot more out of that than I could tell you. The man I got it from was the only one still alive of the group that did the job; but he was the one that handled the important part—the actual personality transfer.

"I cleared his mind of all he knew of the matter and recorded it, but all I understood myself was the principle involved—if that!"

The voice interjected a squeaky, rapid-fire protest. Iliff cut in again quickly:

"Well, if you need it now— You're right about there not having been any subjective switching of personalities involved, and I'm not arguing about whether it's impossible! These people just did a pretty complete job of shifting everything that's supposed to make up a conscious individual from one human body to

another. From any objective point of view, it *looks* like a personality transfer.

"No, they didn't use psychosurgery," he went on. "Except to fill in a six-months sequence of memory tracts to cover the interval they had Tahmey under treatment. What they used was a modification of the electronic method of planting living reflex patterns in robot brains. First, they blanked out Tahmey's mind completely—neutralized all established neural connections and so on, right down to the primary automatic reflexes."

"The 'no-mind' stage?" Lab piped.

"That's right. Then they put the Lycannese Deel in a state of mental stasis. They'd picked him because of his strong physical resemblance to Tahmey."

"That," Lab instructed him sharply, "could have no effect on the experiment as such. Did they use a chemical paralyzing agent to produce the stasis?"

"I think so. It's in the report—"

"You—Zone Agents! How long did they keep the two nerve systems linked?"

"About six months."

"I see. Then they broke the flow and had a *complete* copy of the second subject's neural impulse paths stamped into the first subject's nervous system. Re-energized, the artificial personality would pick up at the exact point it entered mental stasis and continue to develop nor-

mally from there on. I see, I see, I see . . . but what happened to the second subject—Deel?"

"He died in convulsions a few seconds after they returned him to consciousness."

Lab clicked regretfully. "Usual result of a prolonged state of mental stasis—and rather likely to limit the usefulness of the process, you know. Now, there are a few important points—"

"Correlation!" the robot said sharply into Iliff's mind.

The squeaky voice thinned into an abrupt high whistle and was gone.

"I'm here, Iliff! Your friend and guide, Captain Rashallan of Correlation, himself! You haven't started to close in on that Tahmey bird yet, have you? You aren't anywhere near him yet?"

"No," Iliff said. He squinted down at the transmitter and was surprised by a sudden sense of constriction in his throat. "Why?"

The Correlation man took about three minutes to tell him. He ended with:

"We've just had a buzz from Lab—they were trying to get back to you, but couldn't—and what they want us to tell you fits right in—"

"The neutralization of a nervous system that produces the no-mind stage is an effect that wears off completely within two years! Normally, the result is the gradual re-establishment of the original personality; but, in this case, there can be no such

result because all energy centers are channeling constantly into the Deel personality.

"However, there's no reason to doubt that 'Tahmey' is now also present in the system—though unconscious and untraceable because unenergized! Obviously, the Ceetal could have no reason to be interested in a commonplace mentality such as Deel's.

"Now you see how it ties in! Whether it was the Ceetal's intention or not—and it's extremely probable, a virtual certainty, that it was—the whole artificial creation remains stable only so long as the Deel personality continues to function!

"The instant it lapses, the original personality will be energized! You see what's likely to happen to any probing outsider then?"

"Yes," Iliff said, "I see."

"Assuming it's been arranged like that," said Captain Rashallan, "the trigger that sets off the change is, almost certainly, a situational one—and there will be a sufficient number of such triggered situations provided so that any foreseeable emergency pattern is bound to develop one or more of them!

"The Ceetal's purpose with such last-resort measures would be, of course, to virtually insure the destruction of any investigator who had managed to overcome his other defenses, and who was now at the point of getting a direct line on *him* and his little pals!

"So you'll have to watch . . . well,

Zones wants to get through to you now, and they're getting impatient. Good luck, Iliff!"

Iliff leaned forward then and shut off the transmitter. For a moment or so after that, he sat motionless, his yellow eyes staring with a hard, flat expression at something unseen. Then he inquired:

"Did you get Pagadan?"

"There've been several blurred responses in the past few minutes," the robot answered. "Apparently, she's unable to get anything beyond the fact that you *are* trying to contact her—and she is also unable to amplify her reply to the extent required just now! Do you have any definite message?"

"Yes," Iliff said briskly. "As long as you get any response from her at all, keep sending her this: 'Kill Tahmey! Get off Gull!' Make it verbal and strong! Even if the beam doesn't clear, that much might get through."

"There's a very good chance of it," the robot agreed. It added, after a moment, "But the Interstellar operative is not very likely to be successful in either undertaking, Iliff!"

There was another pause before Iliff replied.

"No," he said then. "I'm afraid not. But she's a capable being—she does have a chance."

FOR DISTRIBUTION AT AND
ABOVE ZONE AGENT
LEVELS

Description: . . . mind-parasite of extragalactic origin, accidentally introduced into our Zones and now widely scattered there . . . In its free state a nonmaterial but coherent form of conscious energy, characterized by high spatial motility.

. . . basic I. Q. slightly above A-type human being. Behavior . . . largely on reflex-intuition levels. The basic procedures underlying its life-cycle are not consciously comprehended by the parasite and have not, at present, been explained.

Cycle: . . . the free state, normally forming only a fraction of the Ceetal life-cycle, may be extended indefinitely until the parasite contacts a suitable host-organism. Oxygen-breathing life-forms with neural mechanisms in the general class of the human nervous system and its energy areas serve this purpose.

On contacting a host, the Ceetal undergoes changes in itself enabling it to control the basic energizing drives of the host-organism. It then develops the host's neural carriers to a constant point *five times* beyond the previous absolute emergency overload.

In type-case Ceetal-Homo—Lycanno S-4, 1782—a drastic localized hypertrophy of the central nerve tissue masses was observed, indicating protective measures against the overload induced in the organism.

The advantages to the parasite of developing a host-organism of such abnormal potency and efficiency in

its environment is obvious, as it is indissolubly linked to its host for the major part of its long parasitic stage and cannot survive the host's death. Barring accidents or superior force, it is, however, capable of prolonging the host's biological life-span almost indefinitely.

At the natural end of this stage, the Ceetal reproduces, the individual parasite dividing into eight free-stage forms. The host is killed in the process of division, and each Ceetal is freed thereby to initiate a new cycle—

CHIEF G.Z.: FROM CORRELATION

F. . . . The numerical strength of the original swarm of free-stage Ceetals can thus be set at approximately forty-nine thousand. The swarm first contacted the Toeller Planet and, with the exception of less than a thousand individuals, entered symbiosis with the highest life-form evolved there.

The resultant emergency of the "Toeller-Worm," previously regarded as the most remarkable example known of spontaneous mental evolution in a species, is thereby explained. The malignant nature of the Super-Toeller mirrors the essentially predatory characteristics of the Ceetal. Its complete extermination by our forces involved the destruction of the entire Ceetal swarm, excepting the individuals which had deferred adopting a host.

G. Practical chances of a similar second swarm of these parasites contacting our galaxy are too low to permit evaluation.

H. The threat from the comparatively few remaining Ceetals derives from the survivors' decision to select their hosts only from civilized species with a high basic I.Q., capable of developing and maintaining a dominating influence throughout entire cultural systems.

In the type-case reported, the Ceetal not only secured a complete political dominance of the Class-Twelve System of Lycanno but extended its influence into three neighboring systems.

Since all surviving Ceetals maintain contact with each other and the identity and location of one hundred and eighteen of these survivors was given in the Agent's report, it should not be too difficult to dispose of them before their next period of reproduction—which would, of course, permit the parasite to disperse itself to a dangerous extent throughout the galaxy.

The operation cannot be delayed, however, as the time of reproduction for the first Ceetals to adopt hosts of human-level I.Q. following the destruction of the Toeller Worms can now be no more than between two and five years—standard—in the future. The danger is significantly increased, of course, by their more recent policy of selecting and conserving hosts of *abnormally* high

I.Q. rating well in advance of the "change."

The menace to civilization from such beings, following their mental hypertrophy and under Ceetal influence, can hardly be overstated!

The problem of disposing of all surviving Ceetals—or, failing that, of all such prospective super-hosts—must therefore be considered one of utmost urgency.

"They're telling me!" the Third Co-ordinator said distractedly. He rubbed his long chin, and reached for a switch.

"Psych-tester?" he said. "You heard them? What are the chances of some other Ceetal picking up U-1?"

"It must be assumed," a mechanical voice replied, "that the attempt will be made promptly. The strike you have initiated against those who were revealed by the Agent's report cannot prevent some unknown survivor from ordering U-1's removal to another place of concealment, where he could be picked up at will. Since you are counting on a lapse of two days before the strike now under way will have yielded sufficient information to permit you to conclude the operation against the Ceetals, several of them may succeed in organizing their escape—and even a single Ceetal in possession of such a host as U-1 would indicate the eventual dominance of the species! Galactic Zones has no record of any other mentality who

would be even approximately so well suited to their purposes."

"Yes," said the Co-ordinator. "Their purposes— You think then if U-1 got their treatment, being what he is, he could take *us*?"

"Yes," the voice said. "He could."

The Co-ordinator nodded thoughtfully. His face looked perhaps a little harsher, a little grayer than usual.

"Well, we've done what we can from here," he said presently. "The first *other* Agent will get to Gull in eleven hours, more or less. There'll be six of them there tomorrow. And a fleet of destroyers within call range—none of them in time to do much good, I'm afraid!"

"That is the probability," the voice agreed.

"Zone Agent Iliff has cut communication with us," the Co-ordinator went on. "Correlation informed him they had identified Tahmey as U-1. He would be, I suppose, proceeding at top velocities to Gull?"

"Yes, naturally."

"Interstellar reports they have not been able to contact their operative on Gull. It appears," the Co-ordinator concluded, rather bleakly, "that Zone Agent Iliff understands the requirements of the situation!"

"Yes," the voice said, "he does."

"G. Z. Headquarters is still trying to get through," the robot said. After a moment, it added, "Iliff, this is no longer a one-agent mission!"

"You're right about that! Half

the Department's probably blowing its jets trying to converge on Gull right now! They'll get there a little late, though. Meanwhile they know what we know, or as much of it as is good for them. How long since you got the last sign from Pagadan?"

"Over two hours."

Iliff was silent a moment. "You might as well quit working her beam," he said finally. "But keep it open, just in case. And pour on that power till we get to Gull!"

It did not take long after his landing on that planet to establish with a reasonable degree of certainty that if Pagadan was still present, she was in no condition to respond to any kind of telepathic message. It was only a very little later—since he was working on the assumption that caution was not a primary requirement just now—before he disclosed the much more significant fact that the same held true of the personage who had been known as Deel.

The next hour, however—until he tapped the right three or four minds—was a dragging nightmare! Then he had the additional information that the two he sought had departed from the planet, together, but otherwise unaccompanied, not too long after he had sent Pagadan his original message.

He flashed the information back to the docked ship, adding:

"It's a question, of course, of who took whom along. My own guess is Pagadan hadn't tripped any triggers yet and was still in charge

—and U-1 was still Deel—when they left here! The ship's a single-pilot yacht, shop-new, fueled for a fifty-day trip. No crew; no destination recorded.

"Pass it on to Headquarters right away! They still won't be able to do anything about it; but anyway, it's an improvement."

"That's done," the robot returned impassively. "And now?"

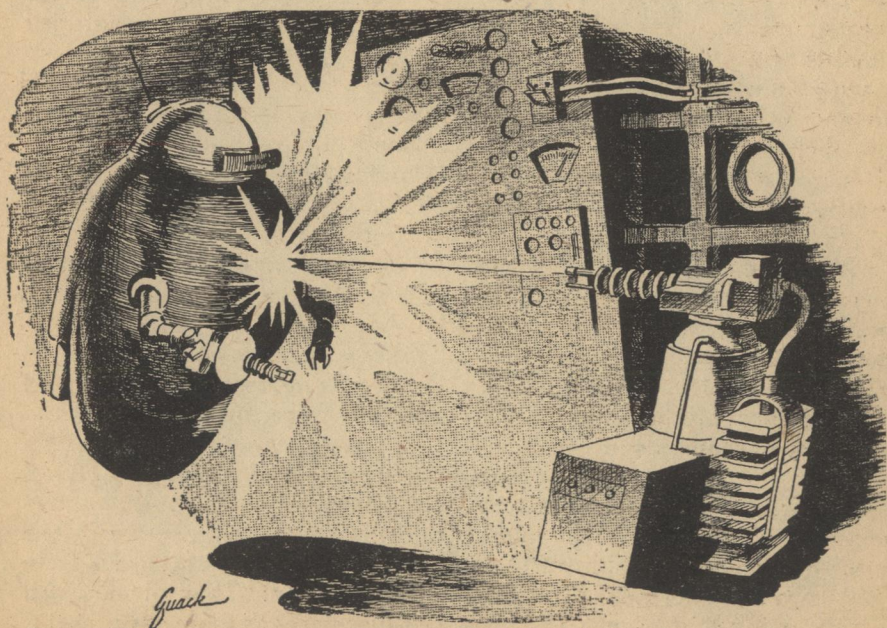
"I'm getting back to you at speed—we're going after them, of course."

"She must have got the message," the robot said after a moment, "but not clearly enough to realize exactly what you wanted. How did she do it?"

"Nobody here seems to know—she blasted those watch-dogs in one sweep, and Gull's been doing flip-flops quietly ever since! The Ceetal's gang is in charge of the planet, of course, and they think Deel and his kidnapers are still somewhere around. They've just been alerted from Lycanno that something went wrong *there* in a big way; but again they don't know what.

"And now they've also begun to suspect somebody's been poking around in their minds pretty freely this last hour or so."

The two men in the corridor outside the Port Offices were using



mind-shields of a simple but effective type. It was the motor tension in their nerves and muscles that warned him first, surging up as he approached, relaxing slightly—but only slightly—when he was past.

He drove the warning to the ship.

“Keep an open line of communication between us, and look out for yourself. The hunt’s started up at this end!”

“The docks are clear of anything big enough to matter,” the robot returned instantly. “I’m checking upstairs. How bad does it look? I can be with you in three seconds from here.”

“You’d kill a few thousand bystanders doing it, big boy! This section’s built up. Just stay where you are. There are two men following me, a bunch more waiting behind the next turn of this corridor. All wearing mind-shields—looks like government police.”

A second later: “They’re set to use paralyzers, so there’s no real danger. The Ceetal’s outfit wants me alive, for questioning.”

“What will you do?”

“Let them take me. It’s *you* they’re interested in! Lycanno’s been complaining about us, and they think we might be here to get Deel and the Lannai off the planet. How does it look around you now?”

“Quiet, but not good! There’re some warships at extreme vision range where they can’t do much harm; but too many groups of men within two hundred miles of us are wearing mind-shields and waiting

for something. I’d say they’re ready to use fixed-mount space guns now, in case we try to leave without asking again.”

“That would be it— Well, here go the paralyzers!”

He stepped briskly around the corridor corner and stopped short, rigid and transfixed in flickering white fountains of light that spouted at him from the nozzles of paralyzer guns in the hands of three of the eight men waiting there.

After a fifth of a second, the beams snapped off automatically. The stiffness left Iliff’s body more slowly; he slumped then against the wall and slid to the floor, sagging jaw drawing his face down into an expression of foolish surprise.

One of the gunmen stepped toward him, raised his head and pried up an eyelid.

“He’s safe!” he announced with satisfaction. “He’ll stay out as long as you want him that way.”

Another man spoke into a wrist-
phone.

“Got him! Orders?”

“Get him into the ambulance waiting at the main entrance of the building!” a voice crackled back. “Take him to Dock 709. We’ve got to investigate that ship, and we’ll need him to get inside.”

“Thought it would be that,” Iliff’s murmur reached the ship. “They’ll claim I was in an accident or something and ask to bring me in.” The thought trailed off, started up again a moment later: “They might as well be using sieves as those government-

issue mind-shields! These boys here don't know another thing except that I'm wanted, but we can't afford to wait any longer. We'll have to take them along. Get set to leave as soon as we're inside!"

The eight men who brought him through the ship's ground lock—six handling his stretcher, two following helpfully—were of Gull's toughest; an alert, well-trained and well-armed group, prepared for almost any kind of trouble. However, they never had a chance.

The lock closed soundlessly, but instantaneously, on the heels of the last of them. From the waiting ambulance and a number of other camouflaged vehicles outside concealed semiportables splashed wild gusts of fire along the ship's flanks—then they were variously spun around or rolled over in the backwash of the take-off. A single monstrous thunderclap seemed to draw an almost visible line from the docks towards the horizon; the docks groaned and shook, and the ship had once more vanished.

A number of seconds later, the spaceport area was shaken again—this time by the crash of a single fixed-mount space gun some eighty miles away. It was the only major weapon to go into action against the fugitive on that side of the planet.

Before its sound reached the docks, two guns on the opposite side of Gull also spewed their stupendous charges of energy into space, but very briefly. Near the pole, the ship had left the planet's

screaming atmosphere in an apparent head-on plunge for Gull's single moon, which was the system's main fortress. This cut off all fire until, halfway to the satellite, the robot veered off at right angles and flashed out of range on the first half-turn of a swiftly widening evasion spiral.

The big guns of the moon forts continued to snarl into space a full minute after the target had faded beyond the ultimate reach of their instruments.

Things *could* have been much worse, Iliff admitted. And presently found himself wondering just what he had meant by that.

He was neither conscious nor unconscious. Floating in a little Nirvana of first-aid treatment, he was a disembodied mind vaguely aware of being hauled back once more—and more roughly than usual—to the world of reality. And as usual, he was expected to be doing something there—something disagreeable.

Then he realized the robot was dutifully droning a report of recent events into his mind while it continued its efforts to rouse him.

It really wasn't so bad! They weren't actually crippled; they could still outrun almost anything in space they couldn't outfight—as the pursuit had learned by now. No doubt, he might have foreseen the approximate manner in which the robot would conduct their escape under the guns of an alerted and a sizable section of that planet's war

fleet—while its human master and the eight men from Gull hung insensible to everything in the webs of the force-field that had closed on them with the closing of the ground lock.

A clean-edged sixteen-foot gap scooped out of the compartment immediately below the lock was, of course, nobody's fault! Through the wildest of accidents, they'd been touched there, briefly and terribly, by the outer fringe of a bolt of energy hurled after them by one of Gull's giant moon-based guns.

The rest of the damage—though consisting of comparatively minor rips and dents—could not be so simply dismissed! It was the result, pure and simple, of slashing headlong through clusters of quick-firing fighting ships, which could just as easily have been avoided.

Dreamily, Iliff debated taking a run to Jeltad and having the in-subordinate electronic mentality put through an emotional overhaul there. It wasn't the first time the notion had come to him, but he'd always relented. Now he would see it was attended to! And at once—

With that, he was suddenly awake and aware of the job much more immediately at hand. Only a slight sick fuzziness remained from the measures used to jolt him out of the force-field sleep and counteract the dose of paralysis rays he'd stopped. And that was going, as he bent and stretched, grimacing at the burning tingle of the stuff that danced like

frothy acid through his arteries. Meanwhile, the robot's steel tentacles were lifting his erstwhile captors, still peacefully asleep, into a lifeboat which was then launched into space, came round in a hesitant half-circle and started resolutely back towards Gull.

"Here's our next move," Iliff announced as the complaining hum of the lifeboat's "pick-me-up" signals began to fade from their instruments. "They didn't get much of a start on us—and in an ordinary stellar-type yacht, at that! If they're going where I think they are, we might catch up with them almost any moment. But we've got to be sure, so start laying a global interception pattern at full emergency speeds—centered on Gull, of course! Keep detectors full on and telepath broadcast at ultimate nondirectional range. Call me if you get the faintest indication of a pick-up on either line."

The muted brazen voice stated:

"That's done!"

"Fine. The detectors should be our best bet. About the telepath: we're not going to call Pagadan directly, but we'll try for a subconscious response. U-1's got to be in charge by now, unless Correlation's quit being omniscient, but he might not spot that—at least, not right away! Give her this—"

Events had been a little too crowded lately to make the memory immediately accessible. But, after a moment's groping, he brought it from his mind: the picture of a

quiet, dawnlit city—seas of sloping, ivory-tinted roofs and slender towers against a flaming sky.

The pickup came on the telepath an hour later.

“They’re less than half a light-year out. Shall I slide in and put a tractor on them?”

“Keep sliding in, but no tractors! Not yet.” Iliff chewed his lower lip thoughtfully. “Sure she didn’t respond again?”

“Not after that first subconscious reply. But the yacht may have been blanked against telepathy immediately afterwards!”

“Well, anyway, she was still alive then,” Iliff said resignedly. “Give Headquarters the yacht’s location, and tell them to quit mopping their brows because U-1’s on his own now—and any Ceetal that gets within detection range of him will go free-stage the hard way. Then drop a field of freezers over that crate! I want her stopped dead. I guess I’ll have to board—”

He grimaced uncomfortably and added, “Get in there fast, fella, but watch the approach! There *couldn’t* be any heavy armament on that yacht, but U-1’s come up with little miracles before this! Maybe that Ceetal was lucky the guy never got back to Lycanno to talk to him! It’s where he was pointed, all right.”

“Headquarters is now babbling emotional congratulations!” the robot reported, rather coldly. “They also say two Vegan destroyers will

be able to reach the yacht within six hours.”

“That’s nice!” Iliff nodded. “Get just a few more holes punched in you, and we could use those to tow you in.”

Inclosed in a steel bubble of suit-armor, he presently propelled himself to the lock. The strange ship, still some five minutes’ flight away in fact, appeared to be lying motionless at point-blank range in the port-screens—bow and flanks sparkling with the multiple pinpoint glitter of the freezer field which had wrapped itself around her like a blanket of ravenous, fiery leeches. Any ripple or thrust of power of which she was capable would be instantly absorbed now and dissipated into space; she was effectively immobilized and would remain so for hours.

“But the field’s not flaring,” Iliff said. He ran his tongue gently over his lips. “That guy does know his stuff! He’s managed to insulate his power sources and he’s sitting there betting we won’t blast the ship but come over and try to pry him out! The trouble is, he’s right.”

The robot spoke then, for the first time since it had scattered the freezer field in the yacht’s path. “Iliff,” it stated impersonally and somewhat formally, “regulations do not permit you to attempt the boarding of a hostile spaceship under such suicidal conditions. I am therefore authorized—”

The voice broke off, on a note of almost human surprise. Iliff had not shifted his eyes from the port-

screen below him. After a while, he said dryly:

"It was against regulations when I tinkered with your impulses till I found the set that would let you interfere with me for my own good. You've been without that set for years, big boy—except when you were being overhauled!"

"It was a foolish thing to do!" the robot answered. "I was given no power to act against your decisions, even when they included suicide, if they were justified in the circumstances that formed them. That is *not* the case here! You should either wait for the destroyers to come up or else let me blast U-1 and the yacht together, without any further regard for the fate of the Interstellar operative—though she is undoubtedly of some importance to civilization."

"Galactic Zones thinks so!" Iliff nodded. "They'd much rather she stays alive."

"Obviously, that cannot compare with the importance of destroying U-1 the instant the chance is offered! As chief of the Giant Spacers, his murders were counted, literally, by planetary systems! If you permit his escape now, you give him the opportunity to resume that career."

"I haven't the slightest intention of permitting his escape," Iliff objected mildly.

"My responses are limited!" the robot reminded him. "Within those limits I surpass you, of course, but beyond them I need your guidance. If you force an entry for yourself

into that ship, you may logically expect to die, and because of the telepathic block around it I shall not be aware of your death. You cannot be certain then that I shall be able to prevent a mind such as that of U-1 from effecting his escape before the destroyers get here!"

Iliff snarled, suddenly white and shaking. He checked himself with difficulty, drew a long, slow breath. "I'm scared of the guy!" he complained, somewhat startled himself by his reaction. "And you're not making me feel any better. Now quit giving good advice, and just listen for a change!"

He went on carefully:

"The Lannai's quite possibly dead. But if she isn't, U-1 isn't likely to kill her now until he finds out what we're after. Even for him, it's a pretty desperate mess—he'll figure we're Vegan, so he won't even try to dicker! But he'll also figure that as long as we think she's alive, we'll be just a little more cautious about how we strike at him.

"So it's worth taking a chance on trying to get her out of there. And here's what *you* do! In the first place, don't under any circumstances get any closer than medium beaming range to that crate! Then, just before I reach the yacht, you're to put a tractor on its forward space-lock and haul it open. That will let me in close to the control room, and that's where U-1's got to be.

"Once I'm inside, the telepath block will, of course, keep me from communicating. If the block goes

down suddenly and I start giving you orders from in there, ignore them! The chances are I'll be talking for U-1. You understand that—I'm giving you an order now to ignore any subsequent orders until you've taken me back aboard again?"

"I understand."

"Good. Whatever happens, you're to circle that yacht for twenty minutes after I enter, and at the exact end of that time you're to blast it. If Pagadan or I, or both of us, get out before the time is up, that's fine. But don't pick us up, or let us come aboard, or pay any attention to any instructions we give you until you've burned the yacht. If U-1 is able to control us, it's not going to do him any good. If he comes out himself—with or without us, in a lifeboat or armor—you blast him instantly, of course! Lab would like to study that brain all right, but this is one time I can't oblige them. You've got all that?"

"I've got it, yes."

"Then can you think of any other trick he might pull to get out of the squeeze?"

The robot was silent a moment. "No," it said then. "I can't. But U-1 probably could!"

"Yes, he probably could," Iliff admitted thoughtfully. "But not in twenty minutes—and it will be less than that, because he's going to be a terribly occupied little pirate part of the time, and a pretty shaky one, if nothing else, the rest of it! I may not be able to take him, but I'm sure going to make his head swim!"

It was going wrong before it started—but it was better not to think of that.

Actually, of course, he had never listed the entering of a hostile ship held by an experienced and desperate spacer among his favorite games. The powers that hurled a sliver of sub-steel alloys among the stars at dizzying multiples of the speed of light could be only too easily rearranged into a variety of appalling traps for any intruder.

U-1, naturally, knew every trick in the book and how to improve on it. On the other hand, he'd been given no particular reason to expect interception until he caught and blocked their telepath-beam—unless he had managed, in that space of time, to break down the Lannai's mind-shields without killing her, which seemed a next to impossible feat even for him.

The chances were, then, that the spacer had been aware of pursuit for considerably less than an hour, and that wasn't time enough to become really well prepared to receive a boarding party—or so Iliff hoped.

The bad part of it was that it was taking a full four minutes in his armor to bridge the gap between the motionless, glittering yacht and the robot, which had now begun circling it at medium range. That was a quite unavoidable safety measure for the operation as a whole—and actually U-1 should not be able to strike at him by any conceivable means before he was inside the yacht itself. But his brief outburst on the

ship was the clearest possible warning that his emotional control had dropped suddenly, and inexplicably, to a point just this side of sanity!

He'd lived with normal fear for years—that was another thing; but only once before had he known a sensation comparable to this awareness of swirling, white-hot pools of unholy terror—held back from his mind now by the thinnest of brittle crusts! That had been long ago, in Lab-controlled training tests.

He knew better, however, than to try to probe into that sort of phenomenon just now! If he did, the probability was that it would spill full over him at about the moment he was getting his attack under way—which would be, rather definitely, fatal!

But there were other methods of emotional control, simple but generally effective, which might help steady him over the seconds remaining:

There was, for example, the undeniably satisfying reflection that not only had the major disaster of a Ceetal-dominated galaxy been practically averted almost as soon as it was recognized, but that in the same operation—a bonus from Lady Luck!—the long, long hunt for one of civilization's most ruthless enemies was coming to an unexpectedly sudden end! Like the avenging power of Vega personified was the deadly machine behind him, guided by a mind which was both more and less than his own, as it traced its graceful geometrical paths

about the doomed yacht. Each completed circle would presently indicate that exactly one more minute had passed of the twenty which were the utmost remaining of U-1's life.

Just as undeniable, of course, was the probability that Pagadan's lease on life would run out even sooner than that—if she still lived!

But there wasn't much he could do about it. If he waited for the Vegan destroyers to arrive, the Lannai would have no chance at all. No normal being could survive another six hours under the kind of deliberately measured mental pressure U-1 would be exerting on her now to drain every possible scrap of information through her disintegrating protective patterns.

By acting as he was, he was giving her the best chance she could get after he had sent her in to spring the trap about U-1 on Gull. In the circumstances, that, too, had been unavoidable. Ironically, the only alternative to killing U-1 outright, as she no doubt had tried to do, was to blunder into one of the situational traps indicated by Correlation, and so restore that grim spacer to his own savage personality—which could then be counted on to cope with any Ceetal attempt to subordinate him once more to their purposes!

Waiting the few hours until he could get there to do the job himself might have made the difference between the survival or collapse of civilization not many decades away!

If he had hesitated, the Department would have sent the Interstellar operative in, as a matter of course—officially, and at the risk of compromising the whole Lannai alliance as a consequence.

No, there hadn't been any real choice—the black thoughts rushed on—but just the same it was almost a relief to turn from that fact to the other one that his own chances of survival, just now, were practically as bad! Actually, there was no particular novelty in knowing he was outmatched. Only by being careful to remain the aggressor always, consciously and in fact, by selecting time and place and method of attack, was he able regularly to meet the superiority of the monstrous mentalities that were an Agent's most specific game! And back of him had been always the matchless resources of the Confederacy, to be drawn on as and when he needed them.

Now that familiar situational pattern was almost completely reversed. U-1, doomed himself as surely as human efforts could doom him, had still been able to determine the form of the preliminary attack and force his enemy to adopt it!

So, as usual, the encounter would develop by plan, but the plan would not be Iliff's! His, for once, was to be the other role, that of the blundering, bewildered quarry, tricked into assault, then rushed through it to be struck down at the instant most favorable to the hunter.

Almost frantically, he tore his

mind back from the trap! But it was just a little late—the swirling terror had touched him, briefly, and he knew his chances of success were down by that further unnecessary fraction.

Then the two-hundred-foot fire-studded bulk of the yacht came flashing toward him, blotting out space; and as he braked his jets for the approach he had time to remind himself that the quarry's rush did, after all, sometimes carry it through to the hunter! And that, in any event, he'd thought it all out and decided he still disliked an unfinished job—and that he *had* liked Pagadan.

Swinging himself up to the yacht's forward space lock, every weapon at the ready, he caught the robot's brief thought:

"He's waiting for you! All locks have been released from inside!"

Iliff's "Hm-m-m!" was a pre-occupied salute to his opponent's logic. The lock had swung gently open before him—there was, of course, no point in attempting to hold it closed against a more powerful ship's sucking tractors; it would, simply, have been destroyed. Gingerly, he floated up to and through the opening, rather like a small balloon of greenish steel-alloy in his bulky armor.

No force-field gripped at his defenses, no devastating bolts of radiant energy crashed at him from the inner walls. That spectral, abnormal terror of a moment ago became a dim sensation which stirred

somewhere far down in his mind—and was gone!

He was on the job.

He drove through the inner transmitter, and felt the telepathic barrier that had blanked out the yacht dissolve and reform again behind him. In that instant, he dropped his shields and sent his mind racing full-open through the ship's interior.

There was the briefest of flickering, distorted thought-images from Pagadan. No message, no awareness of his presence—only the unconscious revelation of mind, still alive but strained to the utmost, already marked by the incoherence of ultimate exhaustion! As he sensed it, it vanished. Something had driven smoothly, powerfully, and impenetrably between—something that covered the Lannai's mind like a smothering fog.

Iloff's shields went up just in time. Then he himself was swaying, physically, under as stunning a mental attack as he had ever sustained.

Like the edge of a heavy knife, the impalpable but destructive force sheared at him—slashed once, twice, and was flicked away before he could grip it, leaving his vision momentarily blurred, his nerve-centers writhing.

A wash of corrosive atomic fire splashed blindingly off the front of his armor as he appeared in the control-room door—through it twin narrow-beam tractor rays came ramming in reversed, brain-jarring thrusts at his face-piece. He drove

quickly into the room and let the tractors slam him back against the wall. They could not harm him. They were meant to startle and confuse, to destroy calculation before the critical assault.

The fire was different. For perhaps a minute, his armor could continue to absorb it, but no longer. He was being hurried into the attack from every side. There had been no serious attempt to keep him from getting to the control room—he was meant to come to it.

He saw Págaran first then, as he was meant to see her. Halfway down the narrow room, she sat facing him, only a few feet from the raised control platform against the wall, across which the projector fire came flashing in bluish twelve-inch jets. She was in an ordinary space-suit—no armor. She sat rigid and motionless, blocking his advance down that side of the room because the suit she wore would have burst into incandescence at the first splash of the hellish energies pouring dangerously past her.

U-1 made the point obvious—since he was here to get his ally out of the trap, he could not kill her.

He accepted the logic of that by flicking himself farther along the opposite wall, drawing the fire behind him. As he did so, something like a giant beetle shifted position beyond the massive steel desk on the control platform and dipped from sight again, and he knew then that U-1 was in armor almost as massive as his own—armor that had been a

part of Pagadan's Interstellar equipment. To the end, that was the only glimpse he had of the spacer.

There remained then only the obvious frontal attack with mind-shields locked—across the platform to bring his own powerful projectors to bear directly on his opponent's armor!

If he *could* do that, he would very likely win almost instantly, and without injuring Pagadan. Therefore, whatever was to happen to him would happen in the instant of time he was crossing the room to reach the spacer.

And his gamble must be that his armor would carry him through it.

Some eight seconds had passed since he entered the room. A stubby tentacle on the front of his chest armor now raised a shielded projectile gun and sprayed the top of the desk beyond which U-1 crouched with a mushrooming, adhesive blanket of incendiaries. The tractor rays, their controls smothered in that liquid flaring, ceased to be a distraction; and Iliff launched himself.

The furious glare of U-1's projectors winked out abruptly.

The force that slammed Iliff down on the surface of the platform was literally bone-shattering.

For an endless, agonizing instant of time he was in the grip of the giant power that seemed to be wrenching him down into the solid hull of the ship. Then, suddenly released, he was off the edge of the

platform and on the floor beside it. Momentarily, at least, it took him out of the spacer's line of fire.

But that was about all. He felt bones in his shattered right arm grinding on each other like jagged pebbles as he tried to reach for the studs that would drive him upward again. Throughout his body, torn muscles and crushed nerve-fibers were straining to the dictates of a brain long used to interpret physical pain as a danger signal only; but to activate any of the instruments of the miniature floating tank that incased him was utterly impossible.

He was doubly imprisoned then—in that two and a half ton coffin, and in ruined flesh that jerked aimlessly in animal agonies or had gone flaccid and unfeeling. But his brain, under its multiple separate protective devices, retained partial control; while the mind that was himself was still taut as a coiled snake, bleakly unaffected by the physical disaster.

He knew well enough what had happened! In one titanic jolt, the control platform's gravity field had received the full flow of the projector's energies. It had burned out almost instantaneously under that incalculable overload—but not quite fast enough to save him.

And now U-1's mind came driving in, probing for the extent of his enemy's helplessness, then coldly eager for the kill. At contact range, it would be only a matter of seconds to burn through that massive but no longer dangerous armor and blast out the life that lingered within!

Dimly, Iliff felt him rise and start forward. He felt the probing thoughts flick about him again, cautious still, and then the mind-shields relaxing and opening out triumphantly as the spacer approached. He dropped his own shields, and struck!

Never before had he dared risk the sustained concentration of destructive energy he hurled into U-1's mind—for, in its way, it was an overload as unstable as that which had wrecked the gravity field! Instantly, the flaring lights before his face-piece spun into blackness. The hot taste of gushing blood in his mouth, the last sensation of straining lungs and pain-rocked twitching nerves vanished together. Blocked suddenly and completely from every outward awareness, he had become a bodiless force bulleting with deadly resolution upon another.

The attack must have shaken even U-1's battle-hardened soul to its core. Physically, it stopped him in mid-stride, held him rigid and immobilized with nearly the effect of a paralysis gun. But after the first near-fatal moment of shock, while he attempted automatically and unsuccessfully to restore his shields before that rush of destruction, he was fighting back—and not with a similar suicidal fury but with a grim cold weight of vast mental power which yielded further ground only slowly if at all.

With that, the struggle became so nearly a stalemate that it still meant certain victory for the spacer. Both

knew the last trace of physical life would drain out of Iliff in minutes, though perhaps only Iliff realized that his mind must destroy itself even more swiftly.

Something tore through his consciousness then like jagged bolts of lightning. He thought it was death. But it came again and again—until a slow, tremendous surprise welled up in him:

It was the *other* mind which was being torn! Dissolving now, crumbling into flashing thought-convulsions like tortured shrieks, though it still struggled on against him—and against something else, something which was by then completely beyond Iliff's comprehension.

The surprise dimmed out, together with his last awareness of himself—still driving relentlessly in upon a hated foe who would not die.

The voice paused briefly, then added: "Get that part to Lab. They'll be happy to know they hit it pretty close, for once."

It stopped again. After a moment the bright-looking young man in the Jeltad Headquarters office inquired, not too deferentially:

"Is there anything else, sir?"

He'd glanced up curiously once or twice at the vision tank of the extreme-range communicator before him, while he deftly distributed Iliff's after-mission report through the multiple-recorders. However, it wasn't the first time he'd seen a Zone Agent check in from the Emergency Treatment Chamber of his ship,

completely inclosed in a block of semisolid protective gel, through which he was being molded, rayed, dosed, drenched, shocked, nourished and psychoed back to health and sanity.

With the irreverence of youth, the headquarters man considered that these near-legendary heroes of the Department bore on such occasions, when their robots even took care of heartbeat and breathing for them, a striking resemblance to damaged and bad-tempered embryos. He hoped suddenly no one happened to be reading his mind.

"Connect me," Iliff's voice said, though the lips of the figure in the vision tank did not move, "with Three for a personal report."

"I've been listening," came the deep, pleasantly modulated reply from an invisible source. "Switch off, Lallebeth—you've got all you need. All clear now, Iliff—and once more, congratulations!" And the picture of the tall, gray-haired, lean-faced man, who was the Third Co-ordinator of the Vegan Confederacy, grew slowly through the telepath-transmitter into the mind of the small, wiry shape—half restored and covered with irregular patches of new pink skin—in the ship's Emergency Treatment Chamber.

"Back in the tank again, eh?" the Co-ordinator observed critically. "For the second day after a mission, you don't look too bad!" He paused, considering Iliff closely. "Gravity?" he inquired.

"Gravity!" admitted the embryo.



"That will mess a fellow up!" The Co-ordinator was nodding sympathetically, but it seemed to Iliff that his superior's mind was on other matters, and more pleasing ones.

"Lab's just going to have to design me a suit," Three ran on with his usual chattiness, "which will be nonreactive to any type of synthetigravs, including tractors! Theoretically impossible, they say, of

course! But I'm sure the right approach—"

He interrupted himself:

"I imagine you'll want to know what happened after she got you back to your ship and contacted the destroyers?"

"She left word she was going to get in touch with you on her way back to Jeltad," Iliff said.

"Well, she did that. A remarkably energetic sort of person in a quiet way, Iliff! Fully aware, too, as I discovered, of the political possibilities in the situation! I persuaded her, of course, to take official credit for the death of U-1, and the termination of that part of the Ceetal menace—and, incidentally, for saving the life of one of our Department Agents."

"That wasn't so incidental," Iliff remarked.

"Only in comparison with the other, of course. She really did it then?"

"Oh, she did it all right! I was on my way out fast when she burned him down. Must have been a bad shock to U-1. I understand he hadn't released her mind for more than three or four seconds before she was reaching for his projector."

The Co-ordinator nodded. "The mental resiliency of these highly developed telepathic races must be really extraordinary! Any human being would have remained paralyzed for minutes after such pressures—perhaps for hours! Well, he wasn't omniscient, after all. He thought

he could just let her lie there until he was finished with you."

"How long had he been pouring it on her?"

"About four hours! Practically ever since they hit space, coming out from Gull."

"She didn't crack at all?" Iliff asked curiously.

"No, but she thinks she couldn't have lasted more than another hour. However, she seems to have had no doubt that *you* would arrive and get her out of the mess in time! Rather flattering, eh?"

The agent considered. "No," he said then. "Not necessarily."

His superior chuckled. "At any rate, she was reluctant to take credit for U-1. She thought, if she accepted, you might feel she didn't fully appreciate your plunging in to the rescue."

"Well, you seem to have reassured her. And now, just what are the political results going to be?"

"It's too early to say definitely, but even without any help from us they'd be pretty satisfactory. The Ceetal business isn't for public consumption, of course—the boys made a clean sweep of that bunch a few hours back, by the way!—but there've always been plenty of idiots building U-1 up into a glamorous figure. The Mysterious Great Bandit of the Spaceways and that sickening kind of stuff! They'll whoop it up just as happily now for the Champion of Vegan Justice who sent the old monster on his way, to wit—the Lannai Pagadan! It

won't hurt either that she's really beautiful. And through her, of course, the glamour reflects back on her people, our nonhuman allies."

Iliff said thoughtfully: "Think they'll stay fashionable long enough to cinch the alliance?"

The Co-ordinator looked rather smug. "I believe that part of it can be safely left to me! Especially," he added deliberately, "since most of the organized resistance to said alliance has already collapsed!"

Iliff waited and made no comment, because when the old boy got as confidential as all that, he was certainly leading up to something. And he did not usually bother to lead up to things without some good reason—which almost always spelled a lot of trouble for somebody else.

There was nobody else around at all, except Iliff.

"I had an unexpected visit three days ago," the Co-ordinator continued, "from my colleague, the Sixteenth Co-ordinator, Department of Cultures! He'd been conducting, he said, a personal investigation of Lannai culture and psychology—and had found himself forced to the conclusion there was no reasonable objection to having them join us as full members of the Confederacy. 'A people of extraordinary refinement . . . high moral standards—' Hinted we'd have no further trouble with the Traditionalists either. Remarkable change of heart, eh?"

"Remarkable!" Iliff agreed, watchfully.

"But can you imagine," inquired the Co-ordinator, "what brought Sixteen—between us, mind you, Iliff, as pig-headed and hidebound an obstructionist as the Council has been hampered by in centuries—to this state of uncharacteristic enlightenment?"

"No," Iliff said, "I can't."

"Wait till you hear this then! After we'd congratulated each other and so on, he brought the subject back to various Lannai with whom he'd become acquainted. It developed presently he was interested in the whereabouts of one particular Lannai he'd met in a social way right here on Jeltad a few weeks before. He understood she was doing some work—"

"All right," Iliff interrupted. "It was Pagadan."

The Co-ordinator appeared disappointed. "Yes, it was. She told you she'd met him, did she?"

"She admitted to some circulating in our upper social levels," Iliff said. "What did you tell him?"

"That she was engaged in highly confidential work for the Department at present, but that we expected to hear from her within a few days—I had my fingers crossed there!—and that I'd see to it she heard he'd been inquiring about her. Afterwards, after he'd gone, I sat down and sweated blood until I got her message from the destroyer!"

"You don't suspect, I suppose, that she might have psychoed him?"

"Nonsense, Iliff!" the Co-ordinator smiled blandly. "If I had

the *slightest* suspicion of that, it would be my duty to investigate immediately. Wouldn't it? But now, there's one point—your robot, of course, made every effort to keep Pagadan from realizing there was no human crew manning the ship. However, she told me frankly she'd caught on to our little Department secret and suggested that the best way to keep it there would be to have her transferred from Interstellar to Galactic. As a manner of fact, she's requested Zone Agent training! Think she'd qualify?"

"Oh, she'll qualify!" Iliff said dryly. "At that, it might be a good idea to get her into the Department, where we can try to keep an eye on her. It would be too bad if we found out, ten years from now, that a few million Lannai were running the Confederacy!"

For an instant, the Co-ordinator looked startled. "Hm-m-m," he said reflectively. "Well, that's hardly likely. However, I think I'll take your advice! I might send her over to your Zone in a week or so, and—"

"Oh, no," Iliff said quietly. "Oh, no, you don't! I've been waiting right along for the catch, and this is one job Headquarters is going to swing without me!"

"Now, Iliff—"

"It's never happened before," Iliff added, "but right now the Department is very close to its first case of Zone Agent mutiny!"

"Now, Iliff, take it easy!" The Co-ordinator paused. "I must dis-

approve of your attitude, of course, but frankly I admire your common sense. Well, forget the suggestion—I'll find some other sucker."

He became pleasantly official.

"I suppose you're on your way back to your Zone at present?"

"I am. In fact, we're almost exactly in the position we'd reached when you buzzed me the last time. Now, there wouldn't happen to be some little job I could knock off for you on the way?"

"Well—" the Co-ordinator began, off guard. For the shortest fraction of a second, he had the air of a man consulting an overstuffed mental file.

Then he started and blinked.

"In your condition? Nonsense, Iliff! It's out of the question!"

On the last word, Iliff's thought and image flickered out of his mind. But the Third Co-ordinator sat motionless for another moment or so before he turned off the telepath transmitter. There was a look of mild surprise on his face.

Of course, there had been no change of expression possible in that immobilized and anaesthetized embryonic figure—not so much as the twitch of an eyelid! But in that instant, while he was hesitating, there *had* seemed to flash from it a blast of such cold and ferocious malignity that he was almost startled into flipping up his shields.

"Better lay off the little devil for a while!" he decided. "Let him just stick to his routine. I'll swear,

for a moment there I saw smoke pour out of his ears”

He reached out and tapped a switch.

“Psych-tester? What do you think?”

“The Agent requires no deconditioning,” the Psych-tester’s mechanical voice stated promptly. “As I predicted at the time, his decision to board U-1’s ship was in itself sufficient to dissolve both the original failure-shock and the artificial conditioning later connected with it. The difficulties he experienced, between the decision and his actual entry of the ship, were merely symptoms of that process and have had no further effect on his mental health.”

The Co-ordinator rubbed his chin reflectively.

“Well, that sounds all right. Does he realize I . . . uh . . . had anything to do—?”

“The Agent is strongly of the opinion that you suspected Tahmey of being U-1 when you were first informed of the Interstellar operative’s unusual report, and further, that you assigned him to the mission for this reason. While approving of the choice as such, he shows traces of a sub-level reflection that your tendency towards secretiveness will lead you to . . . out-fox . . . your-

self so badly some day that he may not be able to help you.”

“Why—”

“He has also begun to suspect,” the Psych-tester continued, undisturbed, “that he was fear-conditioned over a period of years to the effect that any crisis involving U-1 would automatically create the highest degree of defensive tensions compatible with his type of mentality.”

The Co-ordinator whistled softly.

“He’s caught on to that, eh?”

He reflected. “Well, after all,” he pointed out, almost apologetically, “it wasn’t such a bad idea in itself! The boy does have this tendency to bull his way through, on some short-cut or other, to a rather dangerous degree! And there was no way of foreseeing the complications introduced by the Ceetal threat and his sense of responsibility towards the Lannai, which made it impossible for him to obey that urgent mental pressure to be careful in whatever he did about U-1!”

He paused invitingly, but the Psych-tester made no comment.

“It’s hard to guess right every time!” the Co-ordinator concluded defensively.

He shook his head and sighed, but then forgot Iliff entirely as he turned to the next problem.

THE END

CONVERGENCE TO DEATH

BY M. C. PEASE

*The strategic calculator could foresee the outcome; defeat.
The City accepted that answer, and was willing to surrender.
But—the very nature of modern war made it impossible!*

Illustrated by Quackenbush

The little gray-haired man sitting cross-legged on the table looked rather like an elfish disciple of yogi. The weird charts and circuit diagrams that lay around him suggested the cabalistic designs of some forgotten magic, and the technicians that darted through the monstrous maze of electronic gadgetry around him resembled spider-slaves weaving an insane web of wire and coaxial cable under the spell of the master alchemist.

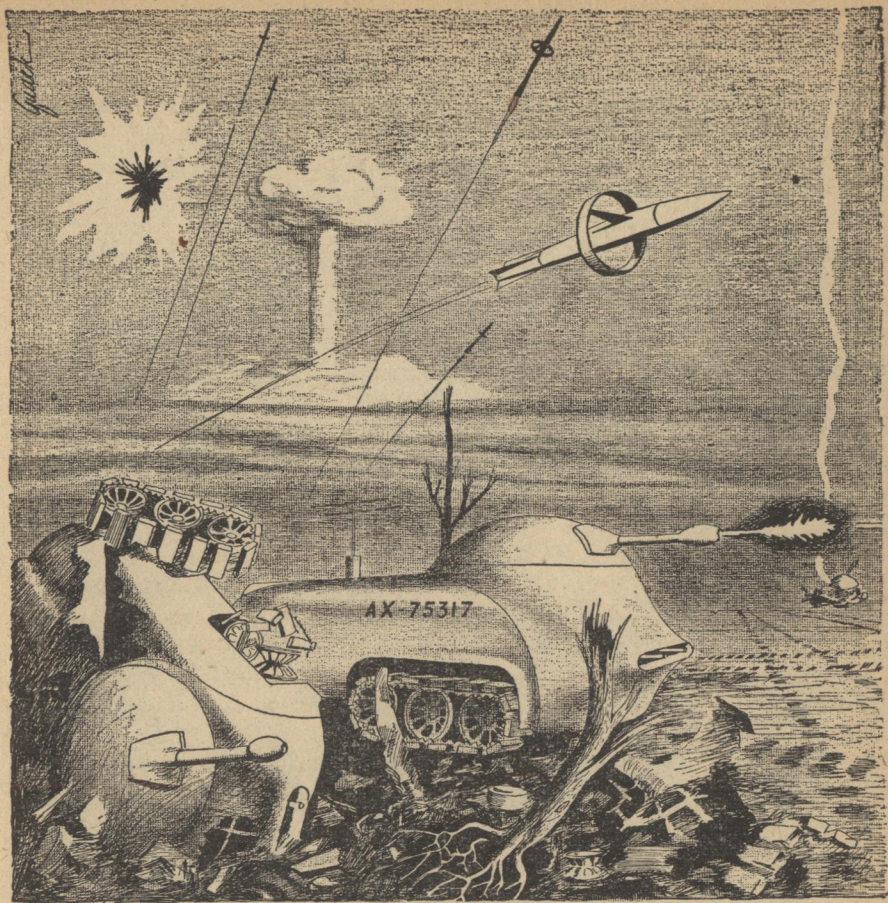
But the gleam of hidden humor—of disbelief in his own importance—that lighted the little man's eye dispelled the suggestion of insanity. And, because of that gleam of sanity, he was virtually unique in all the City.

Far above his head, on the streets and in the buildings of the City, the people walked as if the day of judgment were upon them. The quiet

that lay like a stifling blanket over it all was the silence that precedes death itself. The living walked without life and the dead themselves seemed to stir faintly beneath the ground in morbid welcome.

The City was at war.

Two hundred and ten miles away it raged in all its fury, as it had for the past twelve days. Out there the robot tanks swarmed over the seared wastelands, spitting their flame and destruction on their opposites, guiding and controlling the atomic fires that cast their hellish light over no man's land. Overhead the missiles flew with their evil noses reaching for the enemy, like monstrous, supersonic bats carrying the ancient curse of their blood lust; and curving up from behind the lines went other, lesser missiles with angry shrieks of vengeance on the greater ones.



No human being could have lived there. None did. Long ago as the violence of war reached its insane pitch, the human soldier had been left behind. This was the war of the computers. This was the war that would be lost if but two or three missiles broke through the defenses. Lost without surrender. For when that happened, the City

would be ended, with only those deep in the earth left to mourn its passing.

With such grave responsibility no human could assess the situation at any given moment with sufficient precision and speed. Instead, control of the war had been given to the Master War Computer. It received all the available information from all fronts, calculated the probable enemy

future action, decided the best use of material on the fronts and the best disposition of reserves, activated the former accordingly, and started robot transports shifting the latter as necessary. The orders were transmitted only milliseconds after the information was received.

The enemy, of course, had a similar machine. That fact was known to the City's one, however, and was not ignored in its calculations. On the contrary, it assumed the enemy would make the best possible use of its equipment, and adjusted its own solution accordingly. And then it assumed the enemy would compensate for that adjustment and readjusted its own solution accordingly. And so on, ad infinitum. The limit of the sequence of solutions so found constituted the orders actually transmitted.

But in the present case the sequence converged to defeat, for the enemy had the balance of power. The City walked in the shadow of death. The actuality would be upon it in not more than three days.

Not far away, the Council pondered the situation. The facts were indisputable. The war was lost. The Minister of War had told them that, when the fighting was but a few hours old. The calculations were sufficiently precise so that no miracle seemed possible. Without argument, without question, the Council had accepted the bitter news.

The problem, then was one of sur-

render. Not if, but how. No missile carrying a message could penetrate to the enemy. All channels of communication were blocked. Either they were being used to operate the City's defenses or were being jammed to interfere with the enemy's. To stop or interfere with any part of the defenses for even a fraction of a second was to invite suicide. If but one enemy missile with an atomic war head slipped through in that moment, nothing would be left to surrender.

The City could not surrender by any channel known. For twelve days now the Council had explored all possible channels. None offered any hope.

The Council had also reconsidered the prosecution of the war itself. The prospect of changing its course seemed futile. Yet, when a man is drowning, even a straw is worth seeking.

It was in this spirit that the Council had approved the proposal of Dr. Langer. Three days ago, he had been given a hearing, being the foremost authority in the City on the mathematics of the computer. He had outlined what he wanted to do with a very apologetic air.

"Mr. President and gentlemen," the little, gray-haired mathematician had concluded, "I know it sounds silly. It does to me, too. I spent a bad night before coming here going over it all again because it sounds like such a blasted crackpot idea—but the mathematics are clear. And, since theory gives us

the solution we need, I have to believe the equations, rather than my intuition. If we were winning, no. But, at least according to rumor, we're not. And if we are going to lose anyway, we might as well try."

And so the Council had approved his request. Orders were written:

To: General H. S. Keister,
Commander in Chief

From: L. T. Ramsey, Min-
ister of War

Subject: Orders

(1) Pursuant to the decision of the Council as approved by the President, effective immediately, you will make available to Dr. S. R. Langer the following:

(a) Two spare Master War Computers in order that he may make, or have made, such modifications in them as he may desire.

(b) Access to same for Dr. Langer and such other personnel as he may designate at any time.

(c) Any maintenance, repair, or replacement facilities or personnel as he may request

(2) Upon his request, after notification of the Minister of War or other Council member, you will place whichever computer he designates in control until such time as he requests otherwise.

(3) While you will be held re-

sponsible for the full execution of these orders, the entire responsibility for the consequences thereof resides with the Minister of War and the Council.

(Signed) L. T. Ramsey

Such orders are not usual in a country at war. Control of a key piece of equipment is not normally given to a "long-haired civilian crackpot," as the general called Langer after cooling off a bit. And Keister blistered the paint on his office walls when the professor handed him the orders.

However, the general was a soldier. After calling Ramsey and presenting his views in extreme detail at length, even to offering to resign his command, he finally bowed to authority and issued the necessary orders.

Not that he was convinced. And being a soldier, and something of a spit-and-polish one, the confusion that seemed to reign around the professor did not appease him. He did not like the fact that Langer's hair and clothes were untidy or that the technicians the mathematician had brought in showed no respect at all for anybody.

Then, too, he had assigned Computers Three and Four to Langer. That was unfortunate. The rooms that held the four computers came in to the corridor between the general's combined office and living quarters and the Central Control. Since Three and Four were on

opposite sides of the corridor, a web of cables and wires rapidly threatened to cut him off.

The general was not a happy man.

When the professor walked in on him without being announced, he almost blew a fuse. But with a masterful effort, he controlled himself, though he could not trust himself to speak.

"We're all through, now, general," Langer finally announced, hesitantly, as he weighed the fish-cold glare of the general's eye. "There is about an hour's more testing to do and then I shall be ready to request that you place Number Four in control. Do you wish to notify the Minister of War, or shall I?" For fully a minute, the general continued to stare at him, but finally picked up the phone and called the Minister.

An hour later, with the President and most of the Council watching in Central Control, operations were shifted.

At first glance, the scenes on television scopes showing the battle-front seemed unchanged. As the seconds ticked by, however, the pattern slowly shifted. At first it was only noticeable to the practised eye of the general, as the first faint signs of a general retreat began to be visible. But gradually, as the withdrawal gathered speed, it became obvious to all present.

The general felt a flush of self-justification sweep over him. He tried but he could not restrain the bitter words.

"Your bungling," he said savagely to the professor, "appears to have cost us nearly a mile already. I hesitate to guess what that may mean in terms of time. Are you satisfied? May I switch control back now?" He almost sneered.

The Minister of War looked troubled. He glanced from one man to the other, doubtfully. The President and the Other Council members shifted uneasily on their feet, avoiding each other's eye.

"No," Langer bit out curtly, not shifting his gaze from the scope he was watching. "But stand by to shift when I tell you."

The general jumped, the mathematician's tone had been so different from his usual one of half-apology. He noted the scope that Langer was watching and saw that it showed the front that had started the retreat. With curiosity, he watched it.

The scene that it showed was a little different from the general pattern, he decided. At first he could not put his finger on the change. But then, the light dawned on him. It had been at that front that the retreat had started. Now it was there that a new stabilization was developing. Massive armor was concentrating to stop the attack.

Just as the general was turning to point this out to the President, the little, gray-haired professor spoke.

"Shift control to Number One or Two, as you wish, please." His

voice still held the strange tone of command.

The general nodded to the switchboard operator who made the change smoothly and without wasted time.

"Number One is in control," he announced.

"Now please get me a new prognostication," the professor asked.

No one said anything as they waited for the calculations to be completed. Langer sat down in a chair and seemed to sink into a deep lethargy. He looked terribly tired, as one who has just come through a long strain.

Suddenly a captain dashed into the room gleefully waving a piece of paper.

"It did it! It did it!" he shouted. Then, discipline suddenly reasserting itself, he skidded to a halt and saluted. The general gravely returned it.

"What is your report, captain?"

"Sir," replied the red-faced officer, "present estimate is that we now hold a six percent superiority. The prognostication is that we shall be victorious within nineteen days." He gave a quick salute while a cheer came from those present. The general looked at Langer with a new respect. Silently he walked over and shook the professor's hand.

"Dr. Langer," the President finally said in a voice that cut through the din of conversation and commanded silence, "I won't take the time now to attempt to express

our appreciation of what you have done. That will come later when, no doubt, the entire citizenry will wish to join me in its expression. But I wonder if you can tell us in simple terms just what it is you have done. I am afraid I did not understand much of what you told the Council. And there are others here, such as General Keister, who were not there and who would probably like to know." He glanced at the commanding officer who nodded.

"Yes, I would, very much," the general smiled. "All I know is that Professor Langer came in here and jimmied up two perfectly good computers and made them perform a miracle. I understood that the computers gave us the best use of our material. And, since the enemy has one, too, that would seem to necessarily imply that the one who starts with the most in the best position must win. In the present case, that was the enemy. I would very much like an explanation."

Professor Langer wearily hoisted himself up from the chair where he had been sprawled, and rubbed his hands over his eyes.

"Mr. President, General Keister, gentlemen," he started, as he obviously drew on his last reserves of energy, "what we did was quite simple. We took Number Three and let it operate normally. Only we did not use its solution. Instead we fed it into Number Four as a *forbidden* solution, forcing it, Number Four, to find the *second* best solution, which was what we used.

"Why this worked is perhaps not too difficult to see in a general way. The enemy was continually expecting us to use the *best* solution, and was thrown off balance when we did not. The result, you see, is the somewhat paradoxical one that the second-best was better than the best." He grinned bashfully.

"Actually, of course," he went on, "there's more to it than that. It depends on the nature of the convergence of the sequence of solutions. Had it been what we call 'uniform,' it would not have worked because the second best would have been infinitesimally close to the best solution.

"Instead, the convergence is a much more complicated one. At certain points, as the limit is approached, definite decisions of a yes-or-no type are made. For example, the decision to retreat is one such. You either do or you don't. There are different rates of retreat but that is a matter to be decided afterwards.

"The decision at any switch point is definite. It remains implicit in all subsequent terms of the sequence.

"There is, then, a whole family of what might be called 'quasi-best' solutions, defined and differentiated by the different decisions taken at the different switch points. What we did was to force the controlling

machine, Number Four, to find a different member of this family than the one the enemy was expecting.

"We continued in that course until the pattern of the war had changed. Then it seemed safer to switch back to the conventional control of Number One to see how we were coming out. Since that leaves us ahead, we are now in the position of wanting to fight a conservative war, so we will leave it there.

"And now," he went on with a rueful grin, "if you don't mind, I am very tired. I don't think I have slept since I first thought of this. Frankly, it gave me nightmares, the strain of wondering if all this really made sense or not. I think now I shall be able to sleep for at least seventeen hours, if you will excuse me." He almost stumbled as he left the room.

The President permitted the talk to rise for a minute or so before he called for attention again.

"Gentlemen," he commanded after a bit, "we must return to the Council chambers. An hour ago, more or less, we were trying to find some way of getting our message of surrender out. We still have the same problem, though in reverse. None of us wants to destroy our enemy absolutely. But how are we going to let him surrender?"

THE END

THE ANIMAL-CRACKER PLOT

BY L. SPRAGUE de CAMP

Surely, now, nothing could be more harmless than a manufacturer of animal-cracker cookies. Good, wholesome materials used throughout, too. And still—a deadly weapon!

Illustrated by Cartier

The chief pilot of the ship that had just landed at Bombom on Vishnu handed Luther Beck his cargo manifest, fuel check, flight permit, passenger list, radio transcript, and log. He said: "Only one passenger this time, Luther."

"Who?" said Beck, fumbling through the papers with pudgy fingers.

"Darius Koshay."

"What?"

"Yeah. You know the guy, don't . . . hey, where you going?"

Beck, not stopping to reply, ran down the corridor and burst into the *Comandante's* office without knocking. "*Chefe!*" he yelled, "Koshay's back!"

"*Realmente?*" said Silva, raising frosty eyebrows. "*Tamates*, that'll complicate life, though I wouldn't shout so that Senhor Darius can hear us from here. What's he brought this time?"

"I haven't examined—"

"Then you'd better do so. We shall then know better what he's up to."

Beck shrugged. "Of course. I just thought you'd want to know *imediatamente.*"

"*Obrigado*; I do. Be sure you give him the works. With a microscope."

The plump little customs agent of the *Viagens Interplanetarias* found Darius Koshay awaiting him in the customs shed, slim, dark, and looking like Hollywood's gift to the frustrated female. The entrepreneur had already stripped down to the costume of Earthmen on Vishnu and was sweating like a team of percherons.

"*Alô*, Senhor Luther," said Koshay. "As you see, I couldn't have anything up my sleeve. And if you'll turn on your tube I'll prove I

haven't swallowed anything either."

Beck, rushing Koshay through the X-ray examination, said: "What's all that junk?"

"*Por favor*, my good man, don't call my factory junk!"

"A factory to make what? Looks like a bunch of old stoves and things to me."

"Crackers."

"Crackers?"

"Crackers."

"Are you nuts?"

"Not at all. I learned last time that both the Romeli and the Dzlieri are crazy mad about sweet crackers. Since it wouldn't pay to import them over a distance of several light-years, I propose to make my own."

"Where?" said Beck, rumaging through the cooking equipment.

"On that little plot I leased from old Kamatobden. My lease should still be good, even though I left last time . . . ah . . . a little more suddenly than I expected."

"Where will you get the stuff to make them?"

"Easy. I'll use Vishnuvan wheat for flour, buy my salt, sugar, and spices from the natives, and import my shortening, syrup, and powdered milk from Novorecife."

There must be a catch, thought Beck. Either that, or Darius Koshay must have reformed—a less likely supposition. These ovens and pots looked harmless enough; no secret compartments for contraband weapons or drugs.

After some mental calculations he asked: "Did you bring all this stuff

from Earth? The freight must have been something astronomical."

"No, most of it's surplus I picked up at Novorecife and repaired myself."

"Still, you'll have to sell your crackers for their weight in natural diamonds to get your money back."

Koshay lit up. "Naturally I expect to be paid well, or I wouldn't let myself in for a year of tea and salt tablets. My kidneys must be so tanned now you could use 'em for shoe leather. When you finish snooping, here are the permits and visas and things."

Luther Beck did not want to finish snooping, being still unconvinced that all was kosher. However, the equipment was nothing but a lot of metal sheets fastened together in simple forms. He even held a couple of the pots in front of the fluoroscope, finding nothing suspicious.

He gave up finally and went through Koshay's personal luggage. The trader, who seemed to be getting a quiet boot out of all this, said: "Really, inspector, you'll find everything in order. I'm shoving off as soon as I visit Gwen."

"How are you going to get this stuff through the jungles?"

"I'll hire a couple of the tame Dzlieri as pack horses. Are there any in Bembom now?"

"They'll be drifting in, now that the rutting season's over."

"Still angling for that scholarship, my learned friend?"

"Uh-huh."

"You know," said Koshay, blowing a ring, "I could have one of those long-haired jobs without any stupid courses. I know more about extraterrestrial life than most professional xenologists. But I could never stand the red tape you civil service guys have to put up with."

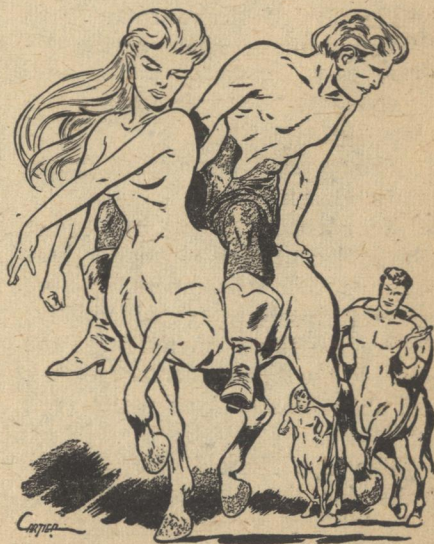
Beck grunted. "I know. You're the strong, adventurous type, impatient of the restraints of civilization." He finished his examination and checked Koshay's papers. Try as he might he could find no discrepancies, and was forced to sign the man out.

With his usual luck, Koshay hired a pair of Dzlieri the same day; they wandered in and out of the wilds with pleas for packing jobs. When the man even persuaded them to fetch a mare of their kind to carry him personally, Beck thought, the rascal's a wizard with them; the most exasperating thing about his bragging is that it's mostly true. Beck saw him disappear into the steaming drizzle, perched impudently on the back of the female, while the two stallions, waving their hands and gabbling, swayed behind under their loads.

After the ship took off for Novorecife on Krishna, life at Bembom settled into its usual round. Beck was busy for some days checking the cargo that had come in. An entrepreneur came out of the jungle, deposited his goods, drew supplies, and vanished into the woods again.

A member of the *Viagens* ground crew took sick and died of some mysterious disease, and all held their breaths waiting to see if an epidemic would develop. Sparks quarreled with slops over the doxy and both had to be psyched by sawbones to straighten them out.

Then one day a battered Romeli crawled into the station and croaked a request for first aid. Stamps saw him first and called sawbones, who patched the native's slaty skin and assured him that his middle eye was not seriously hurt. Meanwhile stamps told the *Comandante*, who fetched the sergeant and Beck for the interview. Sergeant Martins was wanted as the person most concerned in case of shooting-trouble with the Vishnuvans, while Beck



was interested as ranking peace officer.

The interview was halting, since the Romeli knew only a few words of Portuguese, and of the three men only the sergeant was fluent in Romeli. The aborigine lay on his back twiddling his twenty-four fingers and toes while the *sargento* translated.

The commandant asked: "What was the fight about?"

The Romeli replied via interpreter: "I would not agree with the new war plan, so they drove me out."

"What war plan?"

"The plan of Mogzaurma against the Dzlieri." (Beck knew Mogzaurma as the high priest of the neighboring tribe of the Romeli species, and a slippery customer.)

"What plan is that?" continued Silva.

"The plan of Mogzaurma—"

"*Não*, I mean what are the details?"

"Magic."

"What magic?"

"The great Senhor Augusto knows what magic is."

Silva earned his salary by keeping calm and courteous no matter how irritating his Vishnuvan visitors proved themselves. He said quietly: "There are times when I miss the good old Earth, and this is one. Ask him about this spell or whatever it is."

"The spell," said the Romeli, "calls for the destruction of the Dzlieri."

"Yes, but *how*?"

The Romeli scratched his bandages with his right middle limb. "I know little of magic. That is for the priests."

"What do you know of this particular spell?"

"I . . . I think it has something to do with destroying effigies of the Dzlieri."

"What sort of effigies?"

"That's all I know."

Silva said: "If the Romeli and Dzlieri want to make a lot of silly spells against each other, it's none of our business. They've always fought, and I suppose they always will. That's what comes of having two species of intelligent life on the same planet. I don't think another planet has that condition. Tell him—"

"Wait, *chefe*," said Beck. "I still have a feeling Koshay's mixed up in this. Let me question him a while. Maybe I can find something. Mteli, how are these effigies to be destroyed?"

"I told you I don't know," grumbled Mteli.

"Were they to be—eaten?"

"You seem to know all about it, so why ask me?"

"Were they?"

"It's none of your business how we deal with our enemies."

"Oh yes it is, since you asked us for help. How'd you like us to rip those bandages off and drive you out of Bembom? Huh?"

"You wouldn't do that. You're supposed to be kind to us. I know about the *Viagens* policy, too."

"That's all right; we don't have to admit you in the first place and we'd be just back where we started. Now, will you answer my questions like a good fellow? Were they to be eaten?"

"Yes."

"That's better. Were they to be little biscuits?"

"Yes."

"And what led you to disagree with this plan?"

"I thought these little biscuits would be too dangerous to spread around among the tribe. We might start using them on each other. Daatskhuna has always been afraid of an outbreak of witchcraft among us."

"Were you to buy them from Darius Koshay?"

"I shouldn't tell you that—"

"We'll find out anyway. You know our mysterious ways."

"I suppose so. All right, we were."

"There you are," said Beck. "I told you he was up to something. Koshay makes sweet crackers all right—animal crackers in the form of Dzlieri, so the Romeli can eat them to kill their enemies by sympathetic magic. How were you going to pay him, Mteli?"

The Romeli answered: "He says his people back on Earth have a magical rite they call dancing, which they do to music. He says they are mad about dancing to our tribal songs, so they will pay him mountains of money for them. According

to the contract, therefore, he gives us the crackers and we let him copy down the songs, with little marks to show the notes."

"Now," said Silva, "I've seen everything. I've heard of ingenious ways of getting around the freight charges to Earth, but this one takes the *bolo*. It's true the people home in Rio were absolutely crazy about some of these Romeli tunes which a xenologist had brought back, the last time I was there. However, I still don't know whether we ought to try to interfere."

The sergeant said: "*Comandante*, we can't allow a major outbreak among these Vishnuvans just when we've got the trade routes stabilized. Also, they'll murder entrepreneurs in the general excitement."

"Would there be an outbreak?" said Silva. "Or would they just stay home and eat their crackers?"

"I'll ask," said the sergeant. "Mteli, were your people going to attack the Dzlieri physically after they had whittled 'em down with their magic?"

"Naturally. How could we seize their property otherwise?"

"Still," said Silva cautiously, "I don't see what law Koshay has broken."

"He's sold arms to the Vishnuvans," said Beck.

"How can you call animal-crackers arms? Come, Senhor Inspector, you're not superstitious; you don't believe Koshay's little crackers work that way, whatever

these poor deluded ones think about them!"

"They do so work!" cried the Romeli, who seemed to have caught the gist of the statement. "And we're not poor deluded anything. I've seen it done. Mogzaurma brought in a captive Dzlieri and worked the rite on him, and he died at once."

"Maybe he was already sick or wounded," said Silva.

"No! No!"

"Maybe he was scared to death," said the sergeant. "You know how natives are."

"Don't you call me a native!" said Mteli, struggling up.

"Well, aren't you?" asked the sergeant.

"Please, *calma*," said Silva. "Sergeant Martins meant no insult, my dear friend. I *have* heard of primitives on Earth who died when they heard the local witch doctor had put a hex on them. But that's not the law; I can't help it if beings get frightened over nothing."

Beck shook his head. "If I scare you to death on purpose I've killed you just as if I'd conked you with a blunt instrument. And as the sergeant says, we can't let them knock off our entrepreneurs, who are human beings even if they are free-lancers. I'd stretch a point."

"How?"

"Go to Koshay's plot and pinch him."

"You're mad, my young friend," said Silva.

"Listen to the eager beavers," said

the sergeant. "Sonny, don't you know how easy it is to disappear in that muck?"

"I know all about it," said Beck. "I've traveled all over that country and never had any trouble. If I can yank Koshay out quickly, the source of all this disturbance will be gone."

Silva explained: "Senhor Luther wants a scholarship to study to be a xenologist, and figures that a few coups like this will get it for him."

"Why not?" said Beck. "If I show I can deal with extraterrestrials—"

"There's one sure way to do *that*," said the sergeant, slapping his holster. "What we need is a reconnaissance in force to put the fear of God into them. No schoolboys—"

"Who you calling a schoolboy?" yelled Beck. "You'd just start a general war of Vishnuvans against Bembom, and first thing you know—"

"*Faça o favor* to be quiet, my dear friends!" cried Silva. "Are we civilized men? We get ourselves excited for nothing. Now, my idea is to try to bring in Kamatobden and Daatskhuna for a quiet discussion—"

"You tried that!" said Beck. "They wanted to kill each other the minute they set eyes—"

The argument raged for another half hour, at the end of which Luther Beck won by sheer lung power and loquacity. It was decided that he should try his plan first; if it didn't work, then it would be time enough to attempt another. Anyway, if Beck's plan failed, he

would probably not be around to argue against any that the others might want to try.

The pilot said: "These maps are practically useless, on account of the stuff grows so fast— Here, I think we got it."

He pointed to a spot on the radar scope that corresponded to Koshay's house on the top-map. The craft sank slowly until the cleared ground around the house appeared out of the fog a few meters below. When they were less than a man's height from the ground, Beck climbed out and lowered himself down the rope ladder to the ground.

He told the pilot: "Watch and see what happens." Then he walked boldly up to Koshay's door and pushed the buzzer. The fog swirled about him as the rotor of the helicopter sucked it down from above and blew it out in all directions from where the craft hovered.

When there was no answer after several minutes, Beck took out a key and opened the door. Gun in hand he slipped in. The last time there had been Koshay trouble he had made a duplicate of Koshay's door key without telling the owner—not strictly legal, perhaps, but one of those dodges officers of the peace have to resort to sometimes.

A search of the premises discovered no Senhor Darius. The general neatness implied that Koshay had gone away at his own convenience. Beck inspected the kitchen where the animal-crackers were made, find-

ing a pair of little molds for stamping them out, one cut in the form of a Dzlieri and one in that of a Romeli.

"Both ends against the middle," thought Beck. There were a couple of canisters half full of the things—one of Romeli and the other of Dzlieri crackers. He ate a few, found them good, and then was oppressed by the ever-present need of water in this Turkish-bath atmosphere. He washed down a couple of salt tablets, wondering if being a Turk had anything to do with Koshay's liking for Vishnu.

Beck went outside again and looked around. The mud was full of footprints, some new, some leading to the house and others away. Most were plainly the three-toed prints of the Dzlieri. After a diligent search, Beck found also a trail of human footprints leading away from the house. After a few steps, however, they stopped. There were indications that the person who had made them had turned at right angles and then hopped on one foot. Evidently Koshay had mounted one of his centaurine visitors and ridden off on it.

Beck called up to the pilot: "Throw me down my stuff, will you? I'm going to trail this guy, and I'll probably have to stay down overnight."

"You crazy?" replied the pilot, but nevertheless he tossed down the pack, the canteen, and the stick. Beck caught them, slung the first two over his shoulders, and gripped

the third. He called: "Come back for me here each day at this time, will you? *Até logo!*" and set out along the trail. The pilot, unable to follow him into the jungle, flew away.

Beck's high canvas boots, supposed to keep out borers, sank into the black slime with each step and came out with squelching sounds. Where the path was flooded he poked with the steel-shod end of his staff to make sure the footing was sound. Perspiration ran off him in rivers; Luther Beck sometimes wondered himself how he kept both stout and active in a climate that wrung most men to lean washed-out rags.

A sudden shower made him no wetter than he was already. A reptilian swamp-dweller gaped a pair of great jaws at him from beside the trail, but a whack on the nose sent it slithering off. Beck was glad he had not had to shoot, for he feared alerting his quarry.

He considered himself lucky when signs indicated that he was approaching a main corral well before dark. Here the vegetation had been thinned out and the ground was higher and drier.

The *plop-plop* of hooflike feet sent Beck bolting into the brush. There he crouched, hoping that he did not share his hiding place with anything poisonous, while half a dozen Dzlieri trotted past. Four were stallions with crested brass helmets on their heads, shields on their arms, and great quivers of

javelins strapped to the upright part of their bodies. A war party making up, he thought.

Beck resumed his approach, very cautiously this time. By flitting from bush to bush he got within sight of the corral, and by scouting around he found a place with a good view. Glasses were almost useless in this pea-soup atmosphere, with the fog billowing a few meters overhead.

The clearing swarmed with Dzlieri all talking at the tops of their naturally loud voices. Beck could make out no individual words above the general uproar. Sure enough, there was Koshay sitting on old Kamatobden's back.

A couple of the creatures had rifles slung over their backs as well as their more usual weapons. Stolen from entrepreneurs in times past, thought Beck; probably without ammunition and rusted to uselessness. Still, the Dzlieri were pretty smart at metal work and would some day perhaps start making their own, the way some primitives on Earth had done. In fact there were rumors— What would then happen to Bembom? Silva was a skilled diplomat and an awfully nice man personally, but Beck doubted that he had the spine for a shooting war. Silva was always one to gloss over and postpone in an effort to put the best face on things. Then command would devolve in fact upon the bluff and sometimes brutal sergeant, who lacked the imagination needed. As for himself, Luther Beck, it was no

doubt true the he was too impulsive.

Some of the Dzlieri were throwing big leaves and other vegetable matter into a wooden bowl six meters in diameter. One of them poured liquid from a leather bottle over the mixture; another threw in handfuls of powders; a couple more vigorously stirred the mess with spears. Meanwhile others were mixing the Dzlieri cocktail in another bowl, a mere meter in diameter.

Somebody blew a whistle and the noise died. An old Dzlieri whom Beck recognized as Dastankhmden, the medicine man, appeared with what looked like—and probably was—an Earthly beer bottle. He shrilled something of which Beck caught only: “May the gods—” and emptied the bottle into the smaller bowl. A faint but pungent smell stole out to where Beck crouched behind his bush. This must be the secret bitters of the Dzlieri, for which such fabulous prices could be obtained on Earth after the stuff had been cut to one-thousandth of its original strength so that human throats could tolerate it. Could it be—it must be—that Koshay would take his pay from these indigenes in bitters.

The Dzlieri lined up with their mugs and one by one scooped their drinks out of the bowl. They held some sort of drinking ceremony in which they paired off and drank with locked arms, Koshay pairing with Kamatobden. (Something

with a lot of legs was crawling on Beck’s arm.)

Then the chief banged for silence on the edge of the large bowl and began a harangue: “You all know our dear friend Darius, thanks to whose generosity we are at last to wipe our immemorial enemies, the vile Romeli, off the face of the planet. In time I see a great alliance among all the tribes of Dzlieri to exterminate all the tribes of Romeli, even those that live across the great seas.

“Fetch forth the charms! Here they are, created by the invincible magic of the Earthmen on their far world, and smuggled from there over millions of miles, through the terrible emptiness of space, by our faithful friend at terrible risk and staggering cost.” (What a lot of molasses, thought Beck.) “Now the Reverend Dastankhmden will explain their use.”

The priest spoke: “First I will repeat the charm so you can become familiar with it. Then each of you will take one cracker, hold it up, and repeat each line of the charm after me. While you do that, try to keep a picture of a Romeli clearly in your minds. As you finish each line, you will bite off, chew, and swallow a small piece from your cracker. Just a small piece, mind you, since one cracker has to last through the entire charm. Are you ready? Here it is:

“‘As this cracker is consumed, so may your life-force—’ Hey, Dzalgoniten! I said this was just a



rehearsal! You're not supposed to be eating your cracker yet! Get another one and listen quietly.

"As this cracker is consumed, so may your life-force be eaten away.

"As this cracker is chewed, so may your hopes be ground to bits.

"As this cracker goes down—"

"Wow!" A piercing yell just be-

hind Beck made him jump to his feet and whirl. He reached for his pistol just as a Dzlieri, who had stolen up behind him, let fly a lasso he had been whirling. Before Beck could draw, the rope settled over his head. It tautened with a jerk, pinning his arms, and pulled him off his feet.

"Yeow!" screamed his captor, hauling him bumpety-bump over

roots and through bushes out into the clearing. "Look what we have!"

Strong arms jerked Beck, who was still a little dazed, to his feet. They relieved him of his gear. "Anybody know this Earthman?" bellowed Kamatobden. "He looks familiar, but they all look alike."

Koshay said: "He's the customs inspector at Bembom."

"Now I know him," said the chief.

"What's he doing here?"

"How should I know?"

"Which shall we do to him?"

Koshay shrugged. "That's up to you."

"All right." Kamatobden raised his powerful voice: "There are only two things to do—either kill him quickly now, or wait until after the salad and give him a proper execution, with refinements. All in favor of the first—"

The later and more lingering death carried by a large majority. Beck was hustled over to the far side of the corral and thrust into a well-made cage of wooden bars the thickness of his arm and not much farther apart than they were thick. The door shut with a clank and a Dzlieri locked it with an iron key a foot long.

At least the smell of the herd was less overpowering here than in the middle of the corral. The Dzlieri who had locked the door was evidently the official guard, for he hung Beck's belt over one shoulder and tapped the holster affectionately. "I know how to shoot one of these

things," he said with a leer. "So no tricks."

Beck doubted that he did know how to shoot a pistol, since under the strict *Viagens* control a Vishnuvan was lucky if he got a chance to fire a real gun once in a lifetime. However, this was something to remember; no use taking unnecessary chances.

The other Dzlieri went back to their party, and the medicine man resumed his instructions. After he finished, the Dzlieri in charge of the mixing bowl was kept busy by the continuous line of customers waiting their turn for a refill. The party got noisier, some of the creatures singing hoarsely and others demonstrating that the breeding season was not after all quite over.

Koshay came up to the bars with a mug in his hand and looking a little upset. He said: "You fool, why didn't you mind your own business? Now that you've come snooping around here I can't help you."

"You didn't try very hard just now," said Beck, wondering how the entrepreneur could drink the Dzlieri cocktail straight.

"Why should I? I know them. They'd kill you no matter what I said, and if I interfered it would only make trouble for me."

"You might try to steal that key and slip it to me."

"While the sentry's standing a couple of meters away watching us? And then have you get out and try to spoil my deal? How silly do I look, anyway?"

“But—”

“Serves you right for not keeping your nose where it belongs, though I personally wouldn’t have punished you so drastically.”

Koshay strolled off, leaving Beck to mutter curses after him. A couple of the Dzlieri had got into a fist fight, and pounded each other mightily until others separated them.

Beck, trying to fight off despair, got the sentry’s attention and said in halting Dzlieri: “You . . . you make big mistake. That Koshay, he sell magic crackers to your enemies too, so you . . . uh . . . all get killed while he get rich—”

“Stow it,” growled the guard. Another Dzlieri brought him a drink, and when he had drunk that one he yelled until somebody brought him another.

A Dzlieri stumbled up to the cage with an armful of canes and shoved them through, saying: “Here . . . hic . . . Earthman, we can’t decide on a death horrible enough, so this’ll keep you alive for a few hours.”

As he lurched off, Beck remembered that these organisms had fast digestive systems. No doubt they thought that his was equally active and required nourishment soon if he were not to die of starvation. A Dzlieri spent about two-thirds of his waking time just eating. Beck chewed on the end of one of the canes and found it sweet. Well, he might as well die on a full stomach.

The pearly fog overhead was darkening when the party ended in general stupor. The corral was full of Dzlieri lying about in odd attitudes as if they had been machine-gunned, feet in the air, tongues lolling and fragments of the salad scattered about. The place snored like a sawmill. Koshay had passed out early, and even Beck’s sentry was laid out like the rest.

Beck wondered if he couldn’t take advantage of the situation. The key to his cage was hanging in plain sight from his jailer’s harness, and Beck’s belt with its holster and pouches lay around his-neck. However, the sentry had prudently passed out beyond Beck’s reach.

Beck looked around the cage. The only loose objects that might possibly be used for reaching were the canes he had been chewing. He handled a few of them and chose one that seemed stiffer than the rest.

It would not reach.

Surely there must be some way, thought Beck. Wouldn’t he look stupid if he thought of the answer to this little puzzle after the Dzlieri had come to and were flaying him alive? Then he remembered that when he was boning up on biology for his scholarship—which now, alas, seemed more remote than ever—he had read a book on the Earthly great apes. It seemed that a genius of a chimpanzee named Sultan had once reached a fruit outside his cage by taking two sticks and fitting one into a socket in the other to make one long stick.

Well, Beck thought, at least I should be as smart as a chimpanzee. The canes were not ideal for the purpose, being soft, but at length he succeeded in telescoping two of them, one into the end of the other. With this extended arm he found he could reach they key easily enough.

The only trouble was that the key was looped by a stout cord to a snap-ring on the Dzlieri's harness, and try as he might he could not work it loose from that distance, nor yet undo the knot in the cord. He thought some more. If he could get his belt—

He teased the belt off the sentry's head—a tough job, for the belt was heavy with gear and the canes bent. Finally the belt came adrift, and Beck scraped it slowly toward the cage. At least he now had his gun.

What next? While he knew a little about picking locks as a result of his customs work, he had no tools suitable for the purpose. He made a resolve never to set forth on an expedition like this without a length of heavy iron wire for lock-picking.

Of course he had the gun, but so what? Could he hold up the herd and force them to let him go? They didn't look as if they would be aroused even by gunshots. And if he did arouse them, would they obey him, or would they rush the cage and spear him despite his fire, or would they scatter into the woods and leave him there to starve? Unless he could be sure they would follow the first of these courses

there was no point in killing a few, which would merely enrage the rest.

Could he open fire now and massacre the lot before they awoke? He had forty-two shots—fourteen in the gun and two spare magazines—but there were over a hundred Dzlieri present. And anyway he did not know how sound asleep they were. So that was out, especially since he was not sure he could make every shot count in this fading light. Could he blast the lock with his pistol? Maybe, but the ironwork looked solid if crude, and perhaps he would merely jam the works so the door could not be opened without a cutting-torch, and even if he succeeded they might wake up.

No, altogether shooting did not seem to be the answer except as a last-ditch measure. He went through the pockets and attachments that hung from his belt. The most promising item seemed to be the sheath knife. If he had a stout cord to fasten the knife to the end of his pole with, perhaps he could saw that cord that held the key. Unfortunately he had not brought any string along either, and the nearest cord was that which held the key in question.

Well, perhaps he could improvise some string. The canes had twigs with long slim leaves, and by twisting a lot of these together he managed to achieve a fairly secure lashing. Then with the knife on the end of the pole, he reached out and began to saw the cord. He dreaded pricking the Dzlieri with the knife-

point and bringing the extraterrestrial up with a roar of rage, but he had to take the chance. And he couldn't exert any really powerful force on the knife for fear of breaking his slender canes or his precarious lashing.

His arms ached from muscular tension. At this rate it would be black by the time he finished. And then the cord parted. Beck scraped the key towards himself, losing it in the semidarkness several times and having to feel for it. But at last it was his.

He stowed the knife and the string from the key, released the safety of his pistol, and unlocked the door. The screech of the lock he expected to bring all the Dzlieri up standing, but it failed to arouse them. He picked his way through the gloom among the sprawled Vishnuvans until he found Koshay, whose shoulder he shook.

"*Que quer você?*" mumbled the entrepreneur, rubbing his eyes. These eyes widened suddenly when they took in Beck. Koshay tensed himself for action, but subsided when Beck shoved the pistol into his face.

"Shut up," whispered Beck. "One yell and it'll be your last. Roll over on your face and put your hands behind your back."

When Koshay had obeyed, Beck sat on him and tied his wrists together with the key-string. When he felt what was happening, Koshay started to struggle. However, the

pressure of the muzzle on the back of his head quieted him.

"Now come along," said Beck. He marched Koshay over to the edge of the corral, looking about him as he did so. He could not find his walking stick, and for negotiating the swampy parts of the trail a pole or staff of some sort was a practical necessity. Therefore he finally pulled a javelin from one of the Dzlieri's quivers.

As they plunged into the woods, the darkness compelled Beck to use his flashlight. This confronted him with a problem—he needed three hands for light, javelin, and pistol. Not daring to intrust any of these articles to his prisoner, Beck compromised by leaving the pistol in its holster and following Koshay at a distance of three paces with the light in his left hand and the javelin in his right. Now, if Koshay tried to run, he could throw the spear at him and still draw and fire before the man could get out of range. Nobody, he thought, could be very agile with his hands tied behind him.

"Hey," said Koshay, "if I'm going ahead, untie my hands and give me the javelin to feel my way."

"And have you stick me with it? No sir!"

"Then at least give me the light so I can see where I'm walking."

"So you can put it out and bolt?"

"What a suspicious character! Then you go ahead and let me follow."

"And trust you behind me? How silly do I look, anyway?"

"But say, I'm liable to walk into a hole and go in over my head! Or step on some monster. I knew a man who once stepped into the mouth of a mud-worm on a trail like this, and it swallowed him down, *gulp*, before he could even yell."

"That would be a small loss in your case."

"Don't you care what happens to me?" After all we are fellow-human beings."

"I care about as much as you did what happened to me a couple of hours ago. Go on."

They plowed through the slime. The occasional stir of an animal in the vegetation halted them. The hair on Beck's neck prickled.

Koshay grumbled: "You're not so smart as you think. Anybody could figure out a way to get away from those dumb Dzlieri."

And again: "You think you're brave, don't you? Well, you're not. You're just one of those optimistic dopes who thinks everything will always come out right for him. You'll see. When the Dzlieri wake up they'll come after us."

"Not at night," said Beck, "and tomorrow'll be too late. Pipe down and keep going."

Because of the darkness, and the fact that Koshay in his bound condition had to go slowly, the hike back to Koshay's house took nearly all night. They arrived in the pre-dawn twilight. Koshay was covered with mud and filth from having stepped into holes and fallen down; Beck heartlessly had forced him to

scramble up again as best he could.

Then there was nothing to do but wait for the helicopter.

On the ship for Krishna, Koshay made a nuisance of himself. He remembered, for instance, that he was supposed to be a pious Moslem, and pestered Beck five times a day to ask the navigator to calculate the direction of the Solar System so he could pray towards Mecca, though sometimes he almost had to stand on his head to do so. Beck was glad to deliver him into the custody of the regular *policia* at Novorecife.

Preliminary hearings were being held that session by Judge Keshavachandra, whose brows soared up his bald brown forehead like a bird taking off when he heard the case against the prisoner.

"You mean," he said, "that you intend to prosecute this man for arms-traffic because he sold animal-crackers to these warring tribes?"

"That's right, your honor," said Beck.

"But how in the Galaxy can animal-crackers be considered arms?"

Beck explained.

Koshay protested: "That's ridiculous, your honor. Suppose I sold golf clubs to the human beings here at Novorecife—you do have a course, don't you?—well, if I did, and then a golfer killed another with a club in a fit of rage, that wouldn't make me guilty of armsrunning."

"It's a matter of intent, your honor," said Beck. "If Senhor Darius sold golf clubs with the

intent that they should be used as golf clubs, well and good; but if he sold them as weapons, then it's a violation of the statute. See the case of . . . People versus Terschzansky, I think it was—the regular prosecutor can tell you. And if you don't think this magic is effective against beings who believe in it, I urge that you bind the prisoner over while I go back to Vishnu and fetch a Dzlieri and a Romeli. It'll only take a couple of weeks, since the planets are almost in conjunction."

"And what then?"

"We'll stage a duel to demonstrate."

"You mean to have that centaur and that six-legged ape stand up on opposite sides of my courtroom and eat animal-crackers at each other?"

"Yes sir."

The judge sighed, then said with a twinkle: "We'd be famous for all time, no doubt, but it wouldn't be law. If the stunt didn't work, we'd make ourselves ridiculous and accomplish nothing, while if it did we'd all be accessories to a murder. No, I'm afraid I shall have to discharge your man with a warning. Don't take it too hard, Inspector Beck. Morally you're right, and I'm going to see what I can do about revoking his entrepreneur's license. However, you'd never make your charge stand up at a regular trial, I can assure you."

Beck left the court with chin up but spirits drooping, not looking back lest he meet Koshay's triumphant grin. He had begun to feel

like that fellow in the myth who was condemned to roll a boulder up hill again and again. Good-by to his scholarship!

When the next ship for Vishnu took off some days later, Beck was exasperated to learn that Koshay was a fellow-passenger.

"What are you up to now, Senhor Koshay?" he said.

Koshay grinned unregenerately. "I've got a load of golf clubs and balls. You remember that crack of mine at the hearing? Well, it gave me an idea. I bought up all the surplus equipment at Novorecife and made arrangements with the shop to make me some more. I'm betting the Romeli will make great golfing enthusiasts."

"Where'd you get the money?"

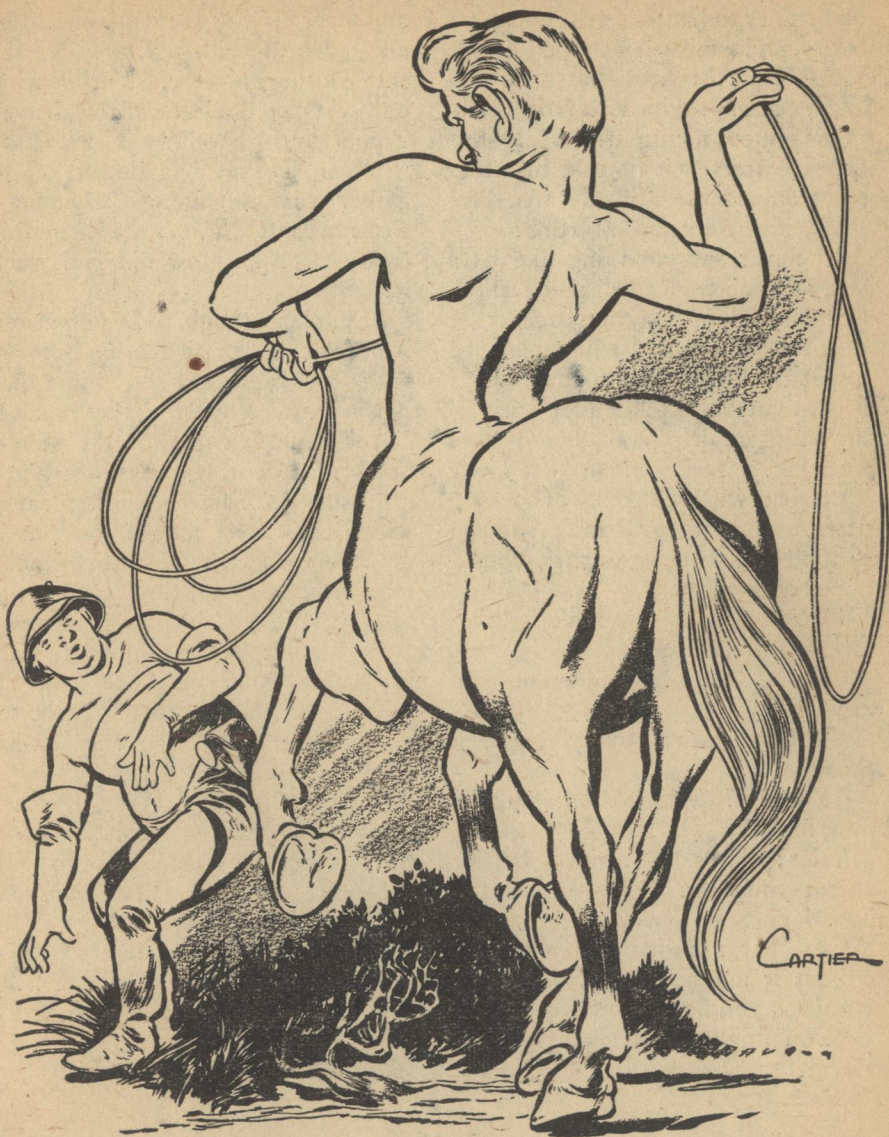
"Oh, I salvaged enough of those Romeli songs, so my credit's good. This time I'll really hit the jackpot."

"Is your license still valid?"

"Nobody had said otherwise up to the time I left. I've got friends, you know. And if old Keshavachandra did get it revoked, that wouldn't affect me until somebody caught up with me and delivered the news. Which might not be easy."

There's a catch somewhere, thought Beck gloomily, and kept away from Koshay the rest of the trip.

When Beck resumed his post as customs inspector at Bembom, his first customer was naturally Darius Koshay. Again, however, the baggage proved to have nothing objec-



tionable in it. Koshay, whistling cheerfully, rented the light tractor and trailer to haul his gear out to his house, and vanished into the jungle.

A couple of hours later he was back, panting, with an arrow stick-in his gluteus maximus. While saw-bones extracted it he told his story to Comandante Silva, Inspector Beck, and Sergeant Martins:

"I never saw anything like it; a party of mixed Romeli and Dzlieri, and instead of fighting each other they took after me! I just managed to get turned around in time, and I had to cut loose the trailer with all my stuff on it. You should have seen me bouncing along that lousy little road with the things whooping after me! If they hadn't stopped to pull my baggage apart, they'd have had me."

"I told you they weren't fighting any more," said Silva.

"Yes. I know you did, but why aren't they?"

"I arranged a treaty between them."

"You did? I don't think it can be done!"

"Yes; that's the mixed border patrol you saw. They police the boundary zone between the tribes to see that none of either species crosses it and starts more trouble. I warned you not to go in there."

"You might have made it more

specific," growled the sufferer. "This is no place for a real man any more. I can see it's going to be all fouled up with red tape like the rest of the universe. I'm clearing out. When does the *Cabot* leave? Tomorrow? Swell."

When Koshay had limped off to gather his remaining belongings, Beck asked: "*Chefe*, what's this treaty really? How did you work it?"

"Simple enough." I persuaded Kamatobden to visit Koshay's house with me, and showed him that Koshay was supplying both sides. It took the evidence of the stored crackers to do it, because those types are stubborn. Then I did the same with Daatskhuna, and in that way I got them together for a friendly talk for the first time in known history."

Beck said: "That's fine. I wish I'd had a hand in it, though. I nearly got killed, and all I got to show for it was the merry ha-ha after that hearing on Krishna."

"Oh, you'll be all right, Luther. If you hadn't taken Koshay out of circulation so he wasn't there to foul things up, I could never have worked on the chiefs. As a reward I've recommended you for that scholarship, and I'm sure you'll get it . . . hey, doctor! I think he's going to faint!"

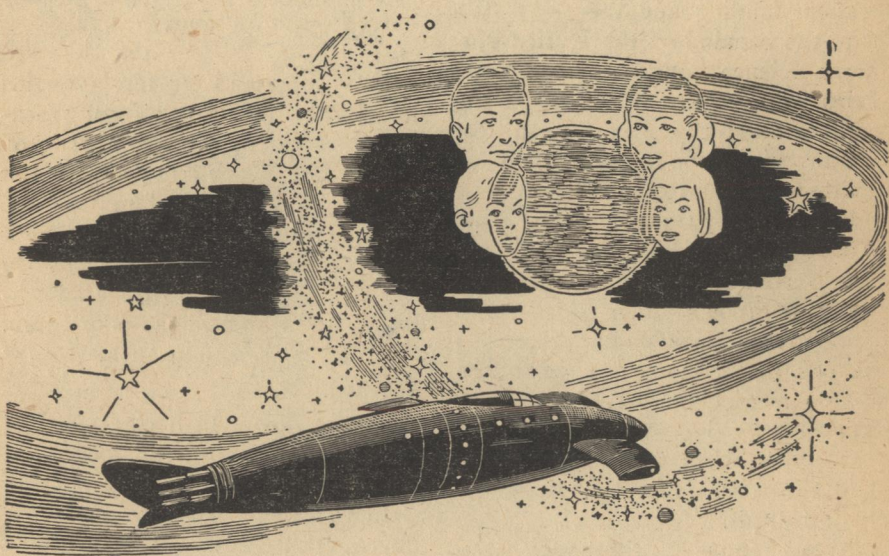
THE END

TRIP ONE

BY EDWARD GRENDON

And this, gentlemen, constitutes a very real problem—and the solution thereof is inherently extremely difficult indeed!

Illustrated by Orban



When she was all ready to go we were afraid to send her. Sometimes it's like that; you have problems and you worry about them for years. Then they are all solved for you and it's the big chance. It's what you have been waiting for—and then it falls apart. It wouldn't be so bad except for the letdown.

They build you up and knock you down.

The ship was beautiful. A hundred and ten feet long and shaped like a hammerhead shark. She was named *The Astra*. One problem after another had been settled. Propulsion was the first big one to be put away. Ingeline took care of

that. Ingeline was the fuel that Walther developed in Germany just at the end of the war. He developed it so that a submarine could outrun a destroyer. Thank God the Nazis never had a chance to use it but plenty of uses were developed later.

The second problem we solved was cosmic rays. We had sent up rocket after rocket carrying sheep and monkeys until we figured out how to protect them. The other problems went fast—oxygen, navigation, landing and the rest. We had the backing of the United Nations Science Foundation and those boys were good. We had sent the ship around the Moon as a test under gyroscope control, full of chimpanzees and orangutans as test freight. Every one of them came back in perfect condition. The automatic cameras got some photographs of the Moon's other side. The photographs looked just like this side of the Moon to everyone but the astronomers, but we didn't care. We were looking forward to the big one—Mars Trip One. Everything had been checked and set and now it was all off.

When Jerrins over at the Research Council phoned me I had an idea it was bad news. Jerrins and I knew each other pretty well and I knew from the tone of his voice that something was wrong.

"I'm coming over, Jake," he said. "Just hold everything until I get there."

We were set to pull out for Mars in twenty-nine hours so we were

pretty busy. "What do you mean, hold everything?" I asked him. "Hold what?"

"Just that. Hold everything. You might as well stop loading supplies because you ain't goin' nowhere. Be over in an hour," and he hung up on me.

I didn't get it. Ten years' work, twenty million bucks spent, and we weren't going. I figured I'd better not tell the boys and just let them go on loading up. It couldn't do any harm to wait an hour.

Fifty minutes later Jerrins pulled in. I knew he'd flown from Washington rather than try to explain by phone, but I couldn't think about anything. I yanked him into the office, slammed the door, opened it and yelled "No visitors or calls" in the general direction of the switchboard, and slammed the door again.

"O.K. Warren what's the dope?" I asked.

He sat down, lit a cigarette and said: "The trip's off for good. It's final, irrevocable and that's all there is to it. I've been with the U.N. Subcommittee on Interplanetary Travel all afternoon. There is no question about it. Finis. Period. Stop."

Finally he told me the whole story. "It's this way, Jake," he said, "it's not a question of not *wanting* to go. Everyone wants the trip to be a success. It's a question of being afraid to go. And I agree. There's too much risk." He stopped for a

moment. "You didn't know it and I didn't know it until now, but a lot of the biology boys have been worrying themselves sick ever since the planning really got started. We haven't thought much about their problems and they have one big one. The U.N. has let us go on beating our brains out because they wanted space travel and they hoped a solution would be found. They wanted space travel so bad that they were willing to put all this money and energy into it in the hope that something could be done; some answer would be found at the last minute. But the Bio boys report no can do."

He stopped, lit a cigarette, leaned across the desk and shoved it into my mouth. Then he leaned back, lit himself another and went on.

"They let the Moon trip go because we weren't landing anywhere. That's O.K. with them. As long as the ship just stays in space it can come back and land, but once it's landed on another planet, it can't ever come back here. That's final. The U.N. is agreed on it and we work for them. As a matter of fact I agree with them myself."

I started to sputter, thought better of it, leaned back and tried to focus my mind. A: Jerrins was a good man and wasn't crazy. He was sorry for me. Come to think of it, I was sorry for him. This must have nearly killed him. B: Our bosses weren't crazy. They were bright, trained men who the U.N. had selected. Space travel was

strictly a U.N. proposition. It was too explosive for any single nation to get to Mars first and the U.N. had the power now to take over. Ergo there must be a good reason why we couldn't go. Also I knew it concerned the microscope and dissection gang. That was all I knew and I was chief engineer in charge of building and was going to be—would have been—chief engineer and captain on Mars Trip One. So—I relaxed, stamped out my cigarette butt and said to Jerrins: "Well?"

He grinned. "You collected yourself fast. It's this way. Do you remember what happened to the Incas? They were a pretty big gang until the Spaniards came in with European diseases. The Spaniards had built up a fairly good immunity to them but the Incas died like flies. They had no immunity. By the same token the Spaniards died of yellow fever, dengue and what not, stuff the Incas had some immunity to." He was speaking very slowly now. "There were diseases in Europe and diseased in South America and they killed people from the opposite continent. People who hadn't built up immunities by selective breeding and by little doses of the disease when they were children. If there were diseases on two different continents that were deadly, what about diseases on two different planets? Suppose you can land on Mars. Suppose you can get back. How will you know you're not carrying something that will kill you six

months later? Or sterilize you? Or kill off the whole human race? When can you ever be sure something isn't incubating inside the crew that will make them ten thousand times worse than Typhoid Mary ever was?"

He stopped and didn't say anything for three or four minutes. Neither did I. Outside the sounds of loading still went on. What he said made sense. Good sense. You couldn't come back. Not ever. A trip to Mars was potential death for every human being. You couldn't risk the human race. I'd always assumed the biologists could handle their end of the job and had left it to them. But I could see now why my medics had seemed worried lately. There didn't seem to be any answer to this problem.

"So Jake," he said finally, "I ain't goin' nowhere and it can be conjugated as a regular verb. You ain't goin' nowhere, we ain't goin' nowhere, and they ain't goin' nowhere. It will be on the radio in a little while. You better tell the boys before that. They'll have their chance at trips later. The U.N. has O.K.'d research trips so long as they just float around. The astronomers will want more photographs of the other face of the Moon, some closeups of Mars, and so forth. But the ship—she stays on the ground for the present."

He got up, patted me on the shoulder and walked out. Sixty seconds later I heard his helicopter taking off.

After twenty minutes of sitting there silently by myself, I stood up and went over to the mirror. I looked at myself in it and thought, *Look here, Jake, you're a big boy now and can take a disappointment. Call the gang in and get it over with.* I walked out to the switchboard and patted the operator on the shoulder.

"Hook me up to the loud-speaker, Evie. Entire plant and grounds. Give it to me in my office and then get me some extra chairs in there. About twelve will do."

Three minutes later my voice was booming out over the grounds and shops: "Attention, attention. Chief Engineer Weinberg speaking. I want all crew personnel, all chiefs of departments and all chiefs of sections in my office immediately. All other loading personnel take a thirty minute break. All crew personnel, department and section chiefs in my office immediately. All others take a thirty minute break. That is all."

The men who crowded into my office were a widely varying lot. They were all shapes, sizes, ages and colors. They had three major factors in common. Each was intelligent, each was highly trained in his own field, and each wanted the Mars trip to be a success, with a desire that was passionate and devoted. They filed in, tense, laughing, joking, worried. They distributed themselves on the chairs, lit cigarettes or pipes and waited. They knew me and knew that if I called them at this late hour something im-

portant was up. It was too early for formal speeches and they all knew I would never dream of making one in any case. It was too late for instructions, they all knew their jobs perfectly by this time. They hoped it was nothing but they knew better.

Twenty minutes later they understood. The medical section had understood as soon as I had started to talk. They had known about this for a long time but were under orders from their U.N. chief to keep their mouths shut and wait. It took the others a little longer to get it. They listened silently, thought, asked a few questions and finally just sat there looking at me. I looked at them for a long minute and suddenly realized something that made me feel wonderful. They were disappointed but not beaten. Most of them had been on this job between three and ten years. They had worked, talked, eaten and slept Mars Trip One. But when they were told it was off they weren't in shock, they weren't in tears, they weren't licked. And this wasn't the refusal of a bunch of fanatics to face the facts. This was a team of highly trained specialists who had faith in their brains and ability and in the knowledge of their sciences. This was the cream of humanity and they knew where they were going. I remembered Don Byrne saying: "There is a wisdom beyond wisdom and a faith beyond faith."

The men were determined. They believed that man could not be per-

manently stopped by anything in the universe. And it wasn't conceit or intellectual snobbishness. Man was heading for the stars and they knew it. They had conquered other obstacles, here was one more. Each had seen apparently insuperable barriers appear in his respective science time and time again but none had halted progress for long. Man had kept expanding intellectually, emotionally and morally in spite of real and imagined hurdles. He was also going to expand and settle the planets and then the stars and these men knew it. They were hard-headed, scientifically trained dreamers and that's an unbeatable combination.

I felt myself relaxing and grinned at them. "Here are your instructions: All perishable supplies are to be battened down. Those supplies on board are to be left there, those in the warehouses left where they are. Put everything on the loading ramps away, either in the ship or back in storage. Use your own judgment. Tell the work crews to report for instructions each morning. They'll get paid for eight hours so long as they report in, whether or not there's a job for them. Then you make any phone calls you want to. But every mother's son of you is to be back here in one hour. Maybe the U.N. is licked but we've got a lot of thinking to do before we are."

They filed out and I sat back and tried to think. My thoughts went 'round and 'round.

Ten minutes later I realized I was defeating my own purpose. There had been attempts to think this through from the top down before. This was a job for teamwork. I went out to the switchboard again. Evie was still there but her ear was glued to the radio. As I came in she flicked it off and looked at me and started to cry.

"Relax Evie," I told her. "Don't believe everything you hear on the radio. Those broadcasters are a bunch of defeatists."

She looked up startled, stopped crying and eyed me questioningly. She had mascara all over her cheeks and looked adorable. I patted her on the shoulder and said: "I want a big conference table moved into my office. More chairs and try to get comfortable ones this time. Leave the other chairs in there. Put them against the wall or something. Then phone all the alternates and tell them I want them as quick as they can get here. Phone Jerrins at the U.N. Research Council and tell him I'd like him to fly back here as soon as he can make it. Then get the kitchen on the phone and tell them I want plenty of hot coffee and sandwiches and I want *good* sandwiches—not just bread and a thin slice of ham. On second thought just get coffee from them. Call a delicatessen in town and get the sandwiches there. We're going to have us a conference. There will be all the crew, the chiefs and the alternates so figure out how much food we'll need and get twice as

much. Then phone supply and tell them I want a small portable air conditioner in my office inside of fifteen minutes. And you'll probably be needed all night so make any phone calls you need to get yourself a relief at the switchboard, grab some notebooks and pencils and come inside when you're finished. And tell the relief that she will probably be needed out here all night, too."

Evie is a dependable gal as well as being ornamental so I knew she'd get everything done. I walked down to the snack bar and bought a few cartons of cigarettes. On the way back I stole ash trays and pads of blank paper from all the empty offices. When I got back the conference table and chairs were in and the boys from supply were plugging in the air conditioner. I scattered my armload of supplies around the table and waited. I was glad I'd thought of the air conditioner. These boys could no more hold a conference without smoking than they could think without doodling, but I'd never believed in the efficacy of a low oxygen content to increase efficiency.

And the alternates were a good idea, too. Every crew member including myself had an alternate. The alternates were just as involved as we were and just as highly trained. If one of us couldn't go, the alternate was all ready to take his place. Having them would double our number and should increase the probability of our finding a way out

of this. Jerrins, too, would help. He had a razor-sharp mind and we had worked together enough to know we complemented each other. Also, if we developed anything good, he was the man to sell it to the U.N. I was glad I'd asked him to come.

Five hours later we were still at it. The room was as jammed as the ash trays. We had batted around a dozen ideas like big tanks of acid on the Moon into which we'd dunk the ship on the way back to cleanse her; and an observation ward into which we'd dunk the crew. Or small boats and suits to be worn on Mars when the landing parties went out while the big ship floated in space. Later the small boats and suits would be jettisoned on Mars. Every plan went haywire on one major count. You couldn't guess at the characteristics of possible bacteria, viruses, fungi and what not, that you might encounter. Jerrins and the four committee members he'd brought back kept pointing up that there was no way of guessing at the staying or spreading powers of these hypothetical critters. The U.N. Medical Commissioner in charge of Interplanetary Travel kept hammering at it. And you couldn't take chances.

One thing that struck me about these boys was that no one ever suggested we use an idea in spite of possible risks. They didn't mind risking their necks but if there was the slightest chance of bringing back infection, they dropped the idea like a hot potato. They were going

to get the trip off somehow but not one of them was a sloppy thinker. A good bunch.

No one figured out the final idea. It came gradually to us all at about the same time. Carruthers, the biologist, said something or other and that was all. We stopped talking for awhile and thought it through. We looked from one to the other, to Jamieson our physicist and atmosphere expert who nodded "yes" to LaRoux our agronomist, to Seivers our psychologist and then to the U.N. medic. All nodded "yes." No one said anything until Evie put down her pencil and notebook, stood up very deliberately and came over and kissed me on the cheek. Then the uproar began.

We have a nice little community here on Mars. We've been here twelve years now. We moved out of *The Astra* four years back. The air is still a bit thin but our big atomic plants are constantly working re-converting the iron oxide this planet is covered with. Plants are growing, we have a truck farm that's not doing badly and a nursery school that's doing even better.

The U.N. psychologists and medics finally selected a hundred and twelve of us to come. Those psychologists were really rough. Every test and interview technique they could figure out. We are now nearer one hundred and fifty. Evie and I have two kids of our own and the oldest has all the makings of a good engineer.

Of course we can never go back, nor can our children—but, if their children are O.K., they can go back to Earth. We figure that if no bad diseases emerge in three generations, things are pretty safe here. Then we'll set up regular travel. We'll never see that ourselves but it will happen. A ship floats around Mars every three years and we communicate by heliograph. They drop supplies and mail and we blink back messages. Each time they come they drop a lifeboat with one couple on it. That way they check if any new diseases have emerged and the

rest of us have gradually built up immunity to it. We've had our diseases, especially the first year, and some of them were weirdies all right, but our medical staff dealt with them quickly and effectively, thank God.

There is the same quality of teamwork here that we so clearly had back in those first planning days. It's a good little culture we have here and it's part of a dream—a good dream. The last papers we had two years ago said a party planned to try for Venus soon. And some day the stars.

THE END

IN TIMES TO COME

Next month's issue should, by all the rules, be very popular. Cover by Rogers. Lead novel by L. Sprague de Camp—off on a wacky tack. Among names probably present will be E. L. Locke with his first story as distinct from article, Arthur Clarke with a lovely little item, Fredric Brown, John D. MacDonald—quite a group. The "Probably Present" category is necessary because type metal being somewhat less elastic than rubber, it's impossible, at this point, to know precisely which stories will fit into the jigsaw-puzzle of magazine make-up. But de Camp will be there, with "The Queen of Zamba"—a major piece laid in the general background which includes the present Animal-Cracker plot. Rogers, incidentally, has done a remarkable cover for it. It's dominated by a portrait of the hero of the yarn, and a lovely piece of portrayal it is!

John MacDonald has an interesting yarn involving one of the more recent discoveries of human psychology—and used in a most unpleasant way. He's really got an idea there, too—it's called "Trojan Horse Laugh."

Incidentally, for a longer-term prediction, we have now on hand a yarn called ". . . And Now You Don't" by one Isaac Asimov. Novel. Concerning the Second Foundation, and where is it? The story, incidentally, gives four completely logical answers. Three of them, however, happen to be wrong. And you'll agree, when you finish, that they do have to be wrong—that there is one and only one correct interpretation of the information available. And that's—well, really, it's Asimov's story. We'll let him tell it.

THE EDITOR.

SECRET WEAPON

BY ALFRED COPPEL

Terrorism—Fear—these have long been the openly used weapons of the tyrant dictator. They certainly aren't the sort of things that can be used as secret weapons. . . .

Illustrated by Brush

Every dictatorship bears within itself the seed of its own destruction. Inherent in the autocratic form is a secret weapon working always for the enemies of tyranny.

CELIA WITMAR DAY, *The Geopolitical History of the Twentieth Century.*

"Come in, Karel!"

The deep, booming voice and the swiftly opening door caught the Minister of Defense for half the world staring wretchedly at his badly chewed fingernails. Abruptly, nervously, he turned his head. Autarch Orlov became aware of the gaze that was at once bleak, fearful, sly. Instantly, the expression was replaced by a shaky smile. The minister straightened himself, gathered his papers, and shuffled in with his characteristic awkward gait, taking a seat on the very edge of a pneumatic chair.

One of the frequent tremors made the room tremble slightly, set-

ting the crystalline fixtures to tinkling faintly. Orlov watched his minister's ill-concealed fright with distaste. He was a strange one, this Karel. He, himself had been the first to explain that his bungling predecessor as Minister of Defense had allowed this impregnable underground fortress to be built on a geologic fault—yet he continued to cringe every time the place rocked a bit. Orlov prodded his memory, trying to recall when, exactly, the quakes had begun. He could not. These little details had a way of escaping him in the busy routine of running the vast People's State. It was sufficient to say that Karel's predecessor, one Kulin, had been incompetent, and, thought the Autarch with thin humor, Kulin was no more.

The sentry at the door had finished checking the Minister of Defense with the electronic weapon detector, indicating to his unseen comrades that Karel carried nothing

that could harm the person of the Autarch. For several minutes the minister fidgeted in his chair, fumbling with the maps and papers he had extracted from his brief case. Orlov fought down a growing impatience by reminding himself that Karel was not as inept as he seemed to be. Things had improved phenomenally since he had taken over the Defense Ministry. The reports from the fighting areas indicated that the man was doing a remarkable piece of work. All the more remarkable when one considers his faint-hearted, nervous disposition.

Still, thought the Autarch, it was a good thing that his own health and condition permitted daily participation in the conduct of the war—even if only through the medium of his ministers. For the thousandth time, Orlov wondered what the fate of the People's State would be when he was no longer able to guide it. He had never permitted an heir-apparent. The danger of an impatient man's *coup d'etat* was ever-present, and Orlov had no intention of relinquishing the power of life and death that he held over each of the half-billion souls of the People's State.

The war against the Entente had been going on for a decade now, and though it went satisfactorily, still he realized that the resources of the planet could not stand the drain for much longer. Already the Moon was being used as a launching site, adding a dreadful penetration to atomic projectiles.

His own forces had landed safely there, and the reports that he received from the Ministry daily told of successes against the Entente's Moon Base. Commander Gorodin's task-force was pressing the Entente garrison viciously.

The surface of the ground was a shambles. Orlov himself, of course, had not been above-ground for over two years, but his TV contacts showed him that the churned and radiating surface of the land was by this time a jungle of rubble disturbed only by the clanking treads of heavy tanks and the concussion of explosives.

Still, Orlov felt certain that the war would soon be over. According to Karel's figures, it could not last out the year. The Entente was on its last legs. Then soon would come the fat rich years of peace and plenty with the whole of the planet one nation under one ruling hand. Orlov's hand—firm and ruthless. It was a good thought.

Karel cleared his throat self-consciously. He seemed even more jittery than ever today, Orlov thought. "The day's reports, excellency," he said, passing the sheaf of neatly arranged papers over the circular desk. "As you will see, everything still goes well." There was a tremulous quality to Karel's voice that irritated the Autarch. "The One Hundred Fifteenth and One Hundred Fortieth Armies have crossed the three thousand kilometer circle. All enemy installations with-



in the area have been liquidated. the Twenty-seventh Tank Corps has penetrated the thirty-five hundred kilometer circle in two places, and sixty nonnuclear guided missiles have been intercepted and destroyed as of fifteen hundred hours today. Our men are everywhere advancing—”

The Autarch grunted. Rapidly, he devoured the contents of the minister's reports. The heavy peasant face might have been carved from granite for all the expression it showed. The hard, flat planes of it gleamed ruddy in the light from the crystalline fixtures. The close-cropped iron-gray hair fitted the leonine head like a skullcap, giving the gross features a classic purity of line they did not deserve. There was strength in every line of Orlov's massive head; strength and steely hardness. But he was pleased. The glittering of the pale eyes showed that what he read in Karel's reports was to his liking.

Things had never run so smoothly before he had installed Karel in the Ministry of Defense. Kulin had not produced successes like these, nor had the others—Radschek, Jansky and Lukas. The lot of them had been fumbling and defeatists, always crying for peace at any price. They had paid the price Orlov demanded of whimperers.

The broad effects which can be obtained by punishment in man . . . are the increase of fear, the sharpening of the sense of cunning—

FRIEDRICH WILHELM NIETZSCHE, *Genealogy of Morals, First Essay.*

Now, thought the Autarch dryly, if only Karel's irritating nervousness did not indicate that he was breaking under the strain, everything would be fine. Of course, it could not be expected that an ordinary man such as Karel could stand up under the pressure of running the Ministry charged with the direct prosecution of the war for over two years without becoming overwrought. Particularly when the the man himself tended to be a rather high-strung, cunning devil. If it stopped there, well and good. If not—the jittery Karel might find himself in the same position as had his unfortunate predecessors. The stakes were high in this game. The rewards were rich and the penalties severe—as severe as painful death could make them. Kulin and Radschek and the others had failed. Orlov had no regrets about them.

Reports in hand, the Autarch turned to his huge war map. As he touched the proper switches, it came to life with sparkling polychromatic lights. The large red star that indicated the central position of the People's State—this vast underground fortress—flickered and the orange circle at two thousand kilometers from it went dull. The green arrowheads representing his armies and corps moved forward, away from the center of the map, until

they touched the next orange circle at three thousand kilometers. There the arrowheads of the One Hundred Fifteenth and One Hundred Fortieth Armies stopped while the smaller arrowhead of the Twenty-seventh Tank Corps moved on to illuminate a segment of the thin circle at thirty-five hundred kilometers.

The map was one of the Autarch's prized possessions. It strengthened his already powerful feeling of having all of the vast domains of the People's State under his fingertips. It was one of Karel's best ideas.

"Who commands the Twenty-seventh Tank Corps, Karel?" he asked.

"Uh . . . Colonel General Volmer, excellency," mumbled the minister.

"See to it that his energy is properly rewarded. A Star of the People's State or an Order of Orlov if he already has the Star."

"At once, excellency."

"You might have him brought here," mused the Autarch, "I could present it myself."

"Such a move would delay Volmer's attack against his next objective, excellency," Karel protested uneasily.

"Very well, then," replied Orlov impatiently, "see to it that the Divisional Commander makes the presentation then—with plenty of pageantry. Soldiers enjoy that sort of thing. Arrange a telecast for me so that I can take part from here."

"Yes, excellency." The minister seemed unduly relieved, but Orlov

could see no reason to pursue the discussion further.

"Have the Subministry of Interior move Security Police into the newly taken areas and see to it that no pro-Entente sentiments remain among the populace. Labor camps must be set up and all available manpower co-ordinated with our own reserves."

"At once, excellency," the minister nodded.

"You have the latest production figures?"

Karel fumbled in his brief case for a moment and extracted the necessary notes. "Here, excellency. As you can see, rocket production has reached a new high, and this month's quota of plutonium is due to be exceeded by eight kilograms."

Orlov permitted himself the luxury of a smile. His heavy features relaxed their usual expression of severity for a moment. Eight kilograms—that would make a good sized hole in the Entente. Good. Very good. Karel was handling the generally recalcitrant scientists very well indeed. He let his eyes take in the neat stacks of papers and reports on his desk. It was well worth the necessary bloodshed to have built up an organization like this. It proved his life-long conviction that men worked much better under the goad of fear than under the haphazard methods employed by the decadent creatures of the Entente. Production figures were high. The Army was advancing. If the war seemed to go slowly, he reasoned, it was

because wars generally went slowly. Particularly wars in which the nations had been allowed to arm themselves with atomic and biological weapons.

In a way it was a pity that the cities were gone—living in underground burrows wasn't pleasant. But the cities had been hopeless anachronisms anyway. The atomic bomb alone had made decentralization absolutely necessary. Why, the first attack alone had killed more than thirteen million people in the urban centers of the Entente! It was amazing how the foolish leaders of the Entente nations had allowed themselves to be duped and misled! For just a moment, Orlov let his mind carry him into the future—into the world that he would build out of the ruins of this one. It made him feel proud and mighty.

The room shook again as one of the continuing tremors struck. The lighting fixtures tinkled icily. Orlov frowned. The quakes had been steadily increasing during the last few weeks. Now it seemed that there were five or six a day at least. Of course he understood that there was a reason for such things. An expert seismographer from the Ministry of Defense had explained that to him. Still—

He glanced at Karel. He was pale and his breathing was shallow and irregular. His thin, bony hands writhed in his lap in a taut, high-strung concert of movement. Orlov's eyes narrowed. Perhaps, he thought

darkly, it was time after all for a new man in the Ministry of Defense.

"What's the matter with you, Karel?" he asked sharply. "Is there something wrong?"

"No, excellency, no!" the minister protested.

The man's fear was an infectious thing, thought Orlov, studying the minister narrowly. Enough close contact with him in his present state would have anyone starting at shadows. He seemed to fear everything, and most of all he feared—Orlov. The thought brought a strange quirk. If Karel was breaking, he should be jettisoned before he could do any damage. At times it looked almost as though the man were losing his grip on sanity. The tension of underground living freely mingled with fear of punishment for failure and fear of ten thousand other smaller things could develop into a first class psychosis. It might be wise to put Karel in a mental hospital—or even, the Autarch thought with deliberate cruelty, a labor camp on the surface.

"Are you feeling poorly, Karel?" he inquired with deceptive softness.

"Quite . . . quite well, excellency, I assure you."

"It may be that you need a rest. A chance to get away from here for a time. A leave of absence in some quiet place—"

The minister's expression changed sharply. "A rest, excellency?"

"You seem upset, Karel. Just as Kulin and the others seemed up-

set just before it became necessary to—”

Karel's face blanched at the mention of his predecessors. He made a protesting gesture with his thin hands as though fending off a physical attack from some unseen thing. "Excellency? Excellency, I beg you—"

Orlov's vicious mood passed as quickly as it had come. It was enough for the time. Karel was warned. A change of subject was now indicated.

He glanced again at the reports from the Ministry. "You have omitted any mention here of Gorodin's campaign against the Entente Moon Base, Karel," he said.

Karel was still shaken from the unexpected threats, but he composed himself with an effort and replied: "I . . . I omitted it deliberately, excellency. I have word that Commander Gorodin will be ready to telecast to you direct within an hour." He consulted his watch. "By eighteen hundred hours, excellency."

Orlov nodded his approval. The Moon Base had long been a thorn in his side. As long as it remained in the hands of the Entente it presented a real and lasting danger. Only Moon-launched projectiles could penetrate the mile of soil overhead to strike directly at this sunken fortress. And if Gorodin was ready to telecast it must mean that the Base was almost in the hands of his task-force.

"Very well, Karel," Orlov said,

"I will not need you for the rest of the day." He glanced at the large wall clock above the map. "It is nearly seventeen hundred hours now. You had better get some rest. You don't look at all well today, and the People's State would suffer if it should . . . lose you." Long habit made the emphasis on the last two words unconscious.

The minister scrambled to his feet looking so ridiculous that Orlov almost felt sorry for him. He smiled at Karel, but the smile was a sinister grimace that seemed to curl the man in upon himself like a spider pierced with a pin.

The Autarch watched contemptuously as the Minister of Defense scurried from the room.

He who wishes to deceive will never fail to find willing dupes.

NICCOLO MACHIAVELLI,
Il Principe.

The hands on the wall clock stood upright, one above the other. The three-dimensional telescreen rose from the floor and the Autarch leaned back in his chair as the lights in the chamber dimmed. Gorodin's technicians must be ready to begin their transmission by this time, thought Orlov and prepared to enjoy it.

Try as he might, he could not rid himself of the thought of Karel. Everything about the man personally indicated a breakdown, and yet the results he produced in the prosecu-

tion of the war were nothing short of miraculous. In combination, the two factors jarred the Autarch in some inexplicable way. There was a wrongness in the situation that could not be explained away.

Another tremor shook the room and Orlov cursed. The increasing frequency of the shocks was annoying. The last one seemed a bit stronger than the rest. The Autarch muttered something uncomplimentary about Kulin's bungling stupidity.

The hissing static of the audio took his thoughts from the dead Kulin's mistakes. He cleared it with a touch of his hand on the RF gain control. The sounds began to come in before the TV setup was fully warmed. Voices filled the room—rough, soldier's voices, giving commands, mouthing curses. The screen took on a milky translucence, became a glaring cube filled with swirling static flecks and laced with the ruddy streaks of the scanning lines. Orlov cut down on the brightness and adjusted the contrast. The picture began to take shape. Orlov leaned forward, intent on the picture cube.

Pressure-suited figures moved awkwardly through the screen. They clumped heavily across the gray, powdery soil. They were fighting in what appeared to be the ruins of a small settlement, for there was rubble everywhere. Three huge Mark XXVI tanks crashed heavily through the wreckage, their projectors glowing angrily. More pres-

sure-suited men clumped after them, firing at the unseen enemy. In the distance, distorted by the focus of the TV cameras, Orlov could make out the stark white tallus of a mountain range, and beyond it a starry, jet-black sky. Battle reports were crackling through the receiver, telling a steady tale of continuing victory against the Entente forces. An officer's voice announced that the Moon Base was surrounded and the rocket launchers disabled.

Orlov studied the picture carefully. There was something about it, in spite of the victorious story it told, that jarred him—something that his subconscious rejected.

Quite irrationally, a tiny bead of unease took shape inside him. He stared hard at the picture, at the men and war machines, at the barren moonscape. His eyes narrowed and he studied the scene with a critical tenseness.

It could be, of course, he thought, that Karel's jittery presence had affected him more than he realized. But even as that thought took shape, he rejected it. Orlov was not one to let the weaknesses of others damage his own perspective. There was something genuinely wrong with the picture in the cube. It was not merely a figment of imagination stirred by association with the neurotic Minister of Defense.

The shock of another tremor, harder and sharper than the rest, jarred him. The TV picture became distorted, like something seen



through quivering gelatin, trembled shudderingly, and then cleared again. Orlov looked about him in alarm. Three shocks in less than an hour!

He turned back to the picture in the cube, shaken. The things that he saw there looked more unreal than ever. Slowly the tiny fragment of uneasiness within him grew into a spiraling, questing thought. Something was wrong—*something was wrong!*

But what?

Everything was as it should be. Or was it? Orlov felt something

cold—beginning to drag at his stomach.

“Sentry!”

A uniformed figure appeared out of the room’s semidarkness.

“Get the Minister of Defense.”

“At once, excellency.”

Orlov returned to his fascinated scrutiny of the TV cube. He had studied the problems of lunar operation in considerable detail. Perhaps he could discover the incongruous factor in the battle scene before him.

Carefully, he began to take stock, making sure that imagination did not color his evaluation.

First of all, thought Orlov, there was no sign of an enemy. That could be explained away. Not easily, but satisfactorily. Secondly, the equipment he could see showed little or no battle damage after what had been reported as a particularly vicious lunar campaign. That was harder to explain, but it, too, could be accounted for.

What else, then, was there that could strike the discordant note?

The men in the cube were still advancing after the unseen enemy, moving awkwardly and sluggishly in their pressure suits—

Moving sluggishly!

With a numb precision, the Autarch's mind began stripping away the substance of the deception.

A pressure suit weighed twenty-five kilograms, he thought—an average man seventy-five. Together they would weigh a hundred. Enough weight to make any man move sluggishly—*on Earth!*

On the Moon, under one sixth gravity, they would move lightly, without effort, as the man's Earth-trained muscles moved a total weight of no more than seventeen kilograms.

Orlov felt as though his mind were being twisted, slowly, irresistibly; being forced into a way of thought that was complete in its alienage. The enormity of the deception broke on his brain like icy water, running icily through his whole body.

The scene in the cube was taking place on Earth!

He who gives truth to tyrants must have courage.

ANONYMOUS.

As the Minister of Defense entered, the Autarch rose furiously to meet him. In front of his desk, he stopped, a great tower of a man, livid with fury.

Karel approached with faltering steps, glancing fearfully out of the corner of his eye at the TV cube where the suited figures still moved like ephemeral puppets. He stuffed his hands into the pockets of his tunic to stop their palsied trembling.

"Excellency, I—" His voice was a high pitched quaver. He broke off helplessly as everything that he had so carefully built up began to crack and crumble about him. Strangely, the realization that this was so brought a kind of stunned composure.

A sharp, severe shock shook the room, bringing a faint rumbling sound. For the first time Karel did not cringe at the tremor. It was Orlov who looked slightly bewildered in spite of his rage.

Karel moved his head in the direction of the TV cube where the images were once again shaking like tenuous dolls incased in jelly. His voice was flat and lifeless, but completely devoid of any nuance of fear. It was as though he were glad to have done with it at last.

"So you found out," he said.

The Autarch felt words rising in him, rushing, jamming his throat. Karel knew! He had dared to deceive *Orlov*! Fury descended on him like a bloody film. He lurched forward and seized the unresisting Karel by the throat, shaking him like a terrier would shake a rat.

Someone was prying him loose from the limp minister before he realized that he was killing him. The sentry had rushed into the room to the minister's defense and was pulling at the Autarch's heavy arms, trying to free Karel.

Still weak with anger, Orlov relaxed his grip on Karel's throat and turned away, breathing hard. Karel slumped to the floor, moaning softly. The sentry was kneeling at the fallen minister's side, working on him, chafing his wrists and forcing air into his lungs. Slowly, Karel revived.

"Take that carrion out of here—no, wait!" Orlov pointed a finger at the door. "You get out, sentry!" He was already thinking that the story of the faked telecast must not be allowed to leak out. It would make him appear ridiculous.

When the sentry was gone, Orlov picked Karel up by the tunic and slammed him into a chair. "Now," he gritted, "Talk!"

Karel looked up at him dull eyed. "There is very little to say," he muttered. "Gorodin was repulsed a week ago by the Entente Moon Base garrison with heavy losses . . . so I arranged"—he shrugged

wearily and indicated the TV cube—"that."

Orlov could scarcely believe his ears. "You . . . you dared?"

A faint smile touched Karel's pale lips. "Yes . . . I dared."

Something in the minister's manner put Orlov even more on his guard. "What else?" he demanded, shaking Karel furiously. "*What else have you faked and lied to me about?*"

Karel's thin, angular face seemed to work jerkily for a moment but no sound came from his lips. Orlov felt the beginnings of panic. "*Talk! What else?*"

For what seemed to be an eternity, there was no sound in the room but the senseless babble from the staged battle in the television screen. And then Karel spoke.

"Everything else," he whispered hoarsely.

Orlov felt the walls caving in. Karel's weak whisper seemed to echo, mocking back and forth across the room, filling all space.

Orlov staggered back toward his desk as though struck by a blow. His hand touched the neat pile of reports and they spilled off the desk, littering the polished floor. "And those, too," he muttered, wide eyed, "all lies? *Lies?*"

Karel nodded dully.

Orlov looked at the war map that glittered in garish idiocy on the wall. "My . . . my armies? My corps? My rocket squadrons?"

Karel shook his head slowly.

"There are no armies. No corps. There are no rocket squadrons. Gorodin's task-force was our last hope—"

Orlov's hands fumbled aimlessly at his own throat like two trapped sparrows. All the strength was gone from his face and he looked old and bewildered. "My . . . my land?" His whispered question was almost plaintive.

The reply was flat, toneless. "There is no more. This fortress is the People's State," Karel said. "And it is under attack. It has been under attack from the Entente Moon Base for weeks—"

"The quakes!" gasped Orlov.

Again, Karel nodded.

"But . . . *why?* WHY?" cried Orlov. "Why wasn't I kept informed? Why did you lie? Why did you all lie? I could have—"

"Perhaps you could have done something. Perhaps not. We all did our best, but when we began to suffer reverses two years ago, we were afraid to tell you."

"Afraid?" Orlov's tone was weak, rasping. He had to fight to hang on to his sanity. He had to fight hard.

"Remember Kulin?" asked Karel thinly. "He told you the truth. And you didn't want to hear it. Where is Kulin now? And Radschek? And Lukas? They all told you what

you didn't want to hear." His expression became suddenly, frighteningly vacuous. "I gave you successes—"

"Lies . . . all lies—" Orlov's once commanding voice was a sob of anguish now.

A thundering roar rolled through the fortress, shaking the floor, distorting the walls and blacking out the wavering TV cube. In the semi-darkness that followed, the bitter smell of ozone poured through the air-conditioning outlet. Almost immediately, another crashing roll of thunder rocked the room. Orlov pitched to the floor, unable to stand. The lights flickered and died. Orlov could hear the frightened cursing of the sentries trying to batter down the badly warped and jammed door. Very weakly, the lights came on again as the emergency system took over the task from the shattered central power station.

Karel smiled crookedly down at the man at his feet. "Moon rockets," he said. "They have the range—" And then he began to laugh crazily.

Orlov lay stunned on the floor listening to the idiotic peals of laughter, his pale eyes turned up toward the ceiling, waiting for the next rocket.

There was nothing else he could do.

THE END

TALKING ON PULSES

BY C. RUDMORE

Specifically, this material refers to speech. Generally, however, any desired information can be transmitted by this pulse system. And it is a powerful tool for getting information concerning many things funneled through one transmitter and receiver. Robots, for instance, can report concerning a score of functions, using one light transmitter-receiver instead of twenty transmitters and twenty receivers! In V-2, for instance!

Pulses are old stuff, really. The brass pounder thumping out a message on a telegraph key; the dial on the telephone clicking merrily as it returns to its original position; and the Indian chief beating a bonfire with a blanket, are all sending pulses. These older ways of using pulses have one thing in common—they are all slow. In any kind of gadget worked by hand, we can not send more than a very few pulses in one second. The needs of World War II brought about a streamlining of pulse methods. Radar opened our eyes to hitherto un hoped for possibilities of very short pulses and corresponding high speed pulsing rates.

Pulses lasting less than a millionth of a second sent and received over a highly directional microwave radio beam put a new slant on an old art. The change in scale of magnitudes encouraged us to try things which before were only pipe dreams.

Micro wave talking circuits using pulses of radio energy were actually born in time to be of some military use in World War II. The intermittent transmission turns out to be an advantage rather than a detriment because more than one pair of talkers can use the same radio beam at the same time without getting in each other's hair. At first thought we might fear that pulsing would

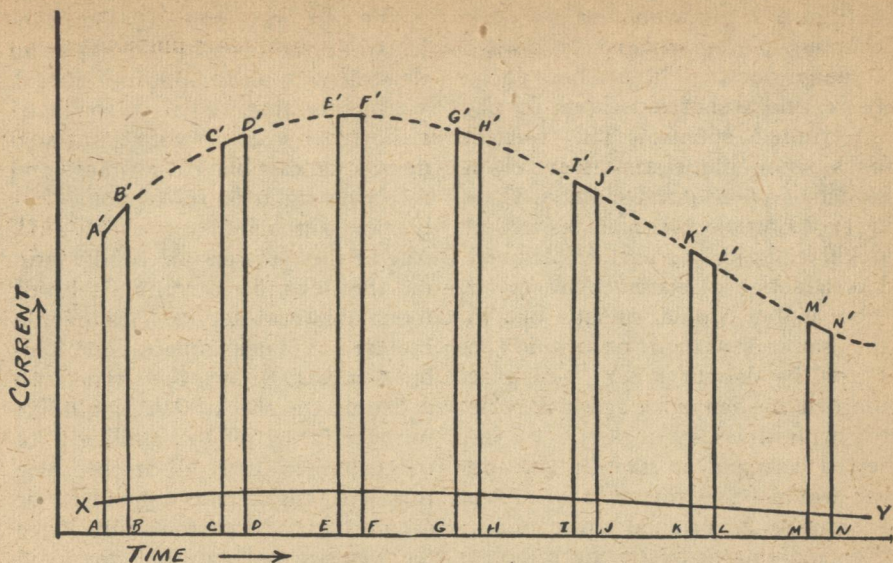
damage speech, but such is not the case if the pulsing is done fast enough.

The situation may be compared to our familiar movies. The screen looks as if the scene were changing in a natural manner, but most of us know that a series of separate stills is being projected at the rate of sixteen per second. Persistence of visual sensation blends the jerky sequence of separate pictures into a smoothed-out pattern which recreates for us the action on the original Hollywood set.

It would in fact be technically possible to project two completely independent super-colossal film masterpieces on the same screen at the same time by alternating their individual pictures and changing stills at the rate of thirty-two per second instead of sixteen. Furthermore it would be possible to view the two movies separately by sitting behind an opaque disk with a viewing slot cut on one side. With the disk revolving sixteen times per second we would find that if we look through the left side of the disk we do not see both pictures, but only the one which is on the screen when the viewing slot is on the left side. If we shift our position to the right side of the disk, we see the other picture. Persistence of vision wipes out the blank spaces occurring when the slot is not in front of our eyes. The picture would not appear as bright as normal because we would only get a spurt of light on our retina each time the slot crossed our

field of vision, but this could be made up by using more illumination on the screen.

Now it is beyond the scope of the present article to discuss the value of telescoping double features into the time normally allotted to one so that the customer can take his choice and go home early. The only excuse for ringing in this bit of phantasy is to help explain how a similar trick which does pay off can be applied to the telephone business. As you might guess, or already know, our ears show persistence of sensation, too, but not on the same scale as the eyes. If a buzzer were put in your telephone wire to interrupt the circuit sixteen times per second while you listen, you would wonder if the fellow at the other end of the line were talking or gargling. Furthermore if you insisted on leaving such a slow buzzer in the circuit, there would be nothing even the best expert could do that would take out the gargle and leave only the clear speech. But if the buzzer were speeded up to about eight thousand interruptions per second, the expert would insert a low pass filter cutting off all tones with pitch above four thousand cycles per second, and you would hear the speech as well as you ever hear it on a commercial telephone. If you stepped up the rate of interruption still further to say thirty thousand per second, the speech would sound perfectly clear to you even without the low pass filter and even if you were using high quality



AN INTERRUPTED SIGNAL

Fig. 1. The flicker of the movie shutter is too fast for the eye; it sees a blended, moving picture. The "stutter" of pulsed sound is too fast for the ear; it can be made to hear a blended, steady conversation.

microphones and receivers instead of the tired old instruments that the inexorable laws of economics allot to us at our present telephone rates. The general rule amply demonstrated by both theory and experiment is that if the interruption rate is at least twice as great as the frequency of the tone of highest pitch we wish to receive, no damage to the recovered sound need be suffered. For commercial speech, we can get along quite well with frequencies below four thousand cycles so we set the minimum interruption rate at eight thousand times per

second, which seems plenty fast after our previous mention of sixteen times per second. But at that we can be grateful that we do not have to construct a telephone system for bats to talk to each other, because their vocal chords and ears are so constructed that they can send and receive tones up to one hundred thousand cycles per second. A bat, therefore, might insist that his circuits should not be interrupted at a rate less than two hundred thousand times per second which is twenty-five times the rate required for human speech.

Figure 1 gives an idea of what chopping pieces out of a speech wave actually does. The dashed curve represents a short specimen of uninterrupted speech. The vertical lines show the times at which a switch is opened and closed. Contrary to what a casual inspection might indicate, this would not sound like a series of hammer blows on the ear but would smooth out to the same sensation as would be caused by the curve XY, a copy of the original but on a reduced scale of magnitudes. An amplifier inserted between the samples and the ear would bring the reduced curve XY up to the original curve A'N'. The idle time between the samples could be used for other conversations provided a scheme for separating them can be devised.

It thus seems possible that a pulsed speech circuit is not just an idle parlor trick to show off how much we have learned about pulses. In things of this sort, however, one should not let enthusiasm run ahead of judgment. We do not want to repeat the error of the cook in the Paul Bunyan legend who was so enamored with sourdough that he wanted to use it for everything. When he mixed sourdough with the timekeeper's ink there was the very deuce to pay. We must be sure that a pulse transmission system has a real field of usefulness where it is actually preferable to other methods, before committing ourselves to a wholesale scrapping of the tried and true older plans.

We can bring some of the problems into the open by looking at an illustrative application. In Figure 2, we suppose that we have a couple of radio towers set up with associated apparatus capable of sending and receiving radio pulses of some frequency authorized by the F.C.C. Maybe these towers are solidly built on the tops of carefully selected mountains and set us back over a hundred kilobucks apiece—one kilobuck = \$1000—by the time we added up the check. We would like to make it pay off by handling a lot of customers' calls all at the same time. It might take a hundred or even a thousand customers to make the venture solvent, but to avoid making our diagram too complicated, we show only four pairs of subscribers who want to talk to each other over our radio link. Once the idea is grasped for a few talkers, we can imagine what we would have to do to take care of a thousand or more talkers.

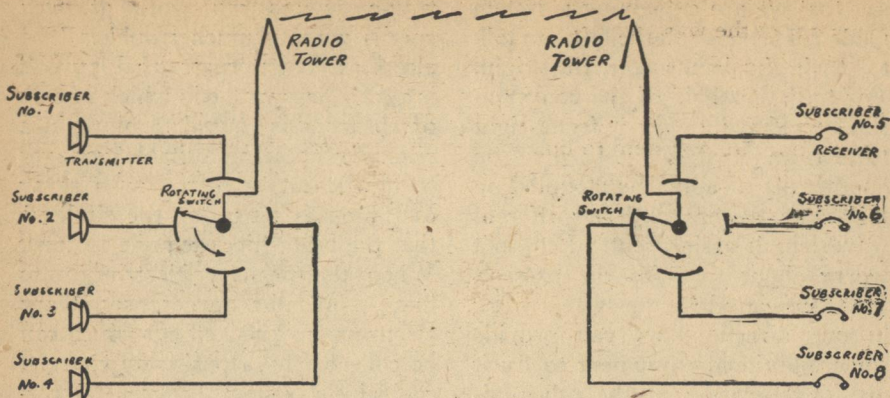
In Figure 2 we show at each end of the system a rotating switch arm and four stationary contacts. The switches at the two ends rotate at exactly the same speed. Each of the four contacts is connected to a different subscriber's telephone, and the switch arm is connected to the radio station. We have shown symbols representing telephone transmitters at the left end of the diagram and telephone receivers at the right, so that we are really only showing how to do one half of each telephone conversation. We might

say that we are explaining a system made for wives—on the left—to talk to their husbands—on the right. For the other half of the conversation, we have to send from right to left, and that might be done on another set of antennas mounted on the same towers with a different wave length assignment. Let's not worry about that for the present, for if we can make the system work in one direction, we can provide some additional equipment to fix it up for operation in the other direction as well.

In the position of the switch arms shown, Subscriber No. 2 can talk to Subscriber No. 8. In the short time later that it takes the arm to move from one contact to the next, No. 2 and No. 8 become completely disconnected from the system, and instead No. 3 talks to No. 7. One more quarter turn cuts 3 and 7 off and puts 4 on with 6. Then No. 1 gets a brief chance to bend the ear of No. 5 before 2 and 8 move in again to start a repetition of this little share-the-line game. If the wheel turns fast enough, each pair of subscribers sees the situation shown in Figure 1; that is, each customer thinks he is talking over a good solid line, and he does not know other people are sandwiching their calls in through blanked out pieces of his conversation.

Now of course we could not do this stunt fast enough with an ordinary motor. In fact any mechanical method of getting the high speeds necessary would be out. But elec-

tronic devices can work at such speeds without much trouble. The electronic counterpart of Figure 2 is a cathode ray tube in which a beam of electrons is caused to move in a circle by applying suitable voltages to the deflecting plates. An array of targets is set up on the circle so that the beam hits each one in turn. When the primary electron beam hits a metallic target, secondary electrons are knocked out which can be collected by a positively charged central electrode. The central collecting electrode forms the hub of the rotating switch, the stream of secondary electrons emitted from the target to the collector forms a conducting path and is the rotating switch arm, while the targets are the stationary contacts. This is probably the most easily understood type of electronic commutator, but is not the only one and is probably not even the most common. Instead of putting all our eggs in one basket by building the entire commutator in one glass envelope, we can use an array of ordinary vacuum tubes such as we have in our radio sets. Instead of operating them in the ordinary manner as in amplifiers, modulators, or detectors, we design circuits around them to make the tubes act like switches. For example when the voltage on the grid of a tube is changed from near zero to a large negative value the circuit between the plate and the cathode is changed from a fairly good conductor to no conductor at all—the effect is much like opening a switch



A RADIO PARTY LINE WITHOUT EAVESDROPPING

Fig. 2. Because electronic gadgets are really fast they can carry on four—or more—conversations at once with us slow humans.

in the plate circuit. By generating a suitable wave of control voltage we can make switches close and open successively in a chain of vacuum tube circuits and simulate all the switching operations we need in Figure 2.

The method of sending a number of telephone conversations simultaneously by letting them share the time in the way we have described is called "time division multiplex" in contrast to "frequency division multiplex" in which different frequency assignments are given the different conversations. We see that pulse techniques go hand in hand with time division multiplex. Before taking up the peculiar virtues which time division offers we should point out one disadvantage which will rule it out immediately in many

kinds of applications. This is the wide band of frequencies it requires for its transmission. A narrow transmission band acts on the pulses in somewhat the same way as the ear does; the pulses are smoothed out and made to overlap each other. This effect would be disastrous in the common path shared by all the pulses, for example, in the path between radio towers in Figure 2. For here the pulses from different conversations follow each other in time and if they get mixed up, all the conversations become hopelessly scrambled. Microwave radio is quite suitable for telephony by pulse transmission because wide bands are available, but in ordinary telephone cables, and in the commercial broadcast band, we shall continue to use frequency division multiplex.

With this confession of limitations out of the way, we can concentrate on how to get the most benefit from pulse methods. If we follow the plan thus far described, we must design our radio system to take care of a wide range of different signal strengths to accommodate samples from the weakest consonants of a Caspar Milquetoast all the way up to the loudest vowels of a hog caller. It is possible to make a radio transmitter satisfy these requirements, but we would rather not if we could avoid it. The cost of radio parts increases with the amount of power to be handled and if we have to build a system that is not only satisfactory for the ordinary talker but also has enough reserve to accommodate occasional bellowing it means that most of the time we are paying for stuff we are not using. The pulse method offers a way of getting around this difficulty in that we are not forced to send these samples in the form of pulses of different heights.

In Figure 1, if we imagine that the duration of switch closure is a lot smaller than there shown, we can see that if the time each channel is actually connected is very small, the signal does not have a chance to change any during the contact. This means that for each contact, we need to transmit only one lone value—just one datum. There is no reason why this datum has to be transmitted as a pulse height. It can be sent as any quantity which can be measured at the receiver. It might be sent as

a value of frequency, a pulse length, or the time of occurrence of a very short pulse within the time allowed for one contact. In any of these cases the pulse height need never be changed, so that the system can be designed to operate with a fixed strength of output signal. Likewise fluctuations in received signal strength caused by fading need not cause any detriment, because we do not have to know the height of the pulse, but only where it begins, or some other feature having nothing to do with the height.

One of these systems under the name of pulse position modulation—PPM—or pulse time modulation—PTM—proved to be useful during World War II. In this scheme an idle channel produces equally spaced pulses. When signal samples are impressed on the channel, the times of occurrence of the pulses are displaced by amounts proportional to the signal samples. Practically this is an easy thing to do by superimposing the signal and a sawtooth sweep voltage on the input to a trigger circuit. The latter name covers a considerable variety of devices which put out a pulse when the input reaches a critical value. The sawtooth sweep by itself would reach the critical value in the middle of its range, but when the signal is added, the time is either advanced or retarded depending on the sign of the signal. The amount of time shift varies with the signal strength.

It turns out that the circuits needed for PPM are fairly small in

size and low in cost. Vacuum tubes, condensers, and resistors are the main ingredients, in contrast to frequency division systems, which usually require quite a few of the more expensive inductance coils. An eight-channel PPM system built by the Bell System for military use was known officially as the AN/TRC-6 or "anturk." It went into action in the North African campaign. A complete transmitter and receiver could be easily hauled in a truck, and could be set up and placed in operation within a few hours. In the first design all the microwave equipment was placed on top of a fifty-foot tower. The tower was of aluminum tubing and was made in six tapered sections which could be telescoped together for shipping. Two five-foot parabolic reflectors formed the transmitting and receiving antennas. These gave such a sharpness of beam that only four millionths as much transmitter power was needed as would be required for nondirective antennas. With the tower properly guyed, the movement of the antenna beam pattern was only a fraction of a degree even in a sixty-mile wind. The sets operated successfully during two hurricanes, and performance was found satisfactory when the equipment was coated with over three quarters of an inch of ice. In an improved version a lighter weight tower was used with a single antenna, and all the microwave equipment was placed on the ground. A parabolic ground reflector was

beamed on a wire mesh forty-eight-degree plane reflector on top the fifty-foot mast. This system transmitted and received on the same antenna system with wave guide filters on the ground separating the transmitted wave from the one to be received. The two directions use different frequency bands.

A peak power of a few watts served for distances as great as one hundred miles. The power was obtained from a small tube—a reflex klystron—no larger than an ordinary tube in a radio receiver. An unobstructed line of sight was necessary between the transmitter and the distant receiver. Since the beam was very sharp other sets using the same frequencies could be operated close by with no interference. The distance between transmitter and receiver was limited by the curvature of the earth, but by using intermediate sets as repeaters the system could be extended to distances of a thousand miles or more.

We might take a closer look at the innards of PPM. Consider first a PPM-AM system. As explained in a previous article* the first abbreviation—PPM for pulse position modulation—refers to the way the pulses are made to represent the signal, and the second—AM for amplitude modulation—to the way in which the pulses are sent over the radio system. Figure 3 shows a set of PPM-AM pulses in the radio

* Astounding Science Fiction, Vol. 39, July, 1947, pp. 86-102.

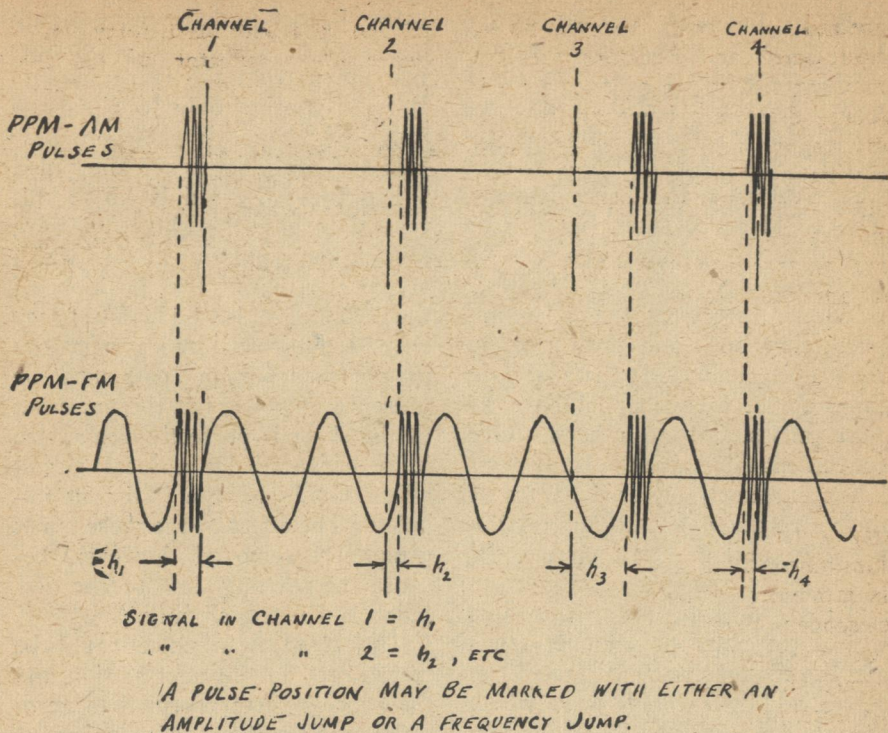


Fig. 3. In terms of light signals, either amplitude—on or off—or frequency—color—change can be used for signaling.

medium, and also a set of PPM-FM—pulse position modulation—frequency modulation—pulses to illustrate the ideas behind our classification scheme. A series of equidistant vertical center lines shows when the pulses would start if the signals in the channels had zero values. Positive values of signal are represented by pulses which begin at proportional times after these reference times and negative values by pulses which begin before.

In the PPM-AM case, the radio frequency wave

is not sent between pulses, while in the PPM-FM case, the radio wave is sent at one frequency between pulses and suddenly changes to a different frequency when the pulse begins. In either case the peak voltage of the radio wave can change over a considerable range without preventing us from telling when the pulses start.

Reception of signals such as shown in Figure 3 presents some special problems. The first stage is a detection process to recover the

baseband pulse, or in other words, to lop off the second part of the abbreviation and get back to PPM only. In the PPM-AM case we would do this by an envelope detector, while in the PPM-FM case we would use a frequency detector. The PPM pulses then have to be routed to the separate channels by electronic devices called "gates," which do just what the name implies: they open and close gates to the proper channels at just the right times to let each channel have its own pulses and no others. One convenient thing about pulse systems is the extremely pictorial nature of their operation. With an oscilloscope connected to the circuit, the engineer can see just what goes on and make adjustments in the same way a carpenter or plumber trims and fits his material. A "gate" can be realized by a voltage wave which keeps a vacuum tube blocked when undesired signals are agitating its grid, but lifts the bias into a conducting region when the proper signal is due. Our British friends are a little more classical and call this sort of thing a "strobe" from the same root as the word is used in "stroboscope," while other engineers prefer to talk about a "pedestal." The reason for the latter term is that a signal pulse by itself is not tall enough to reach up to the operating range of the tube, but if a pedestal voltage is put under it it is raised high enough to get through.

After a wanted pulse has been "gated out" or "strobed," its time

of occurrence is detected by a gadget called a "slicer." A slicer does just about what the name implies. It is responsive only to a narrow range of voltages somewhere near half the peak height of the pulse. When the pulse builds up to this critical height, the slicer operates, sending out a pulse of its own which accurately marks the position of the incoming pulse. The latter may have been distorted by imperfections in the transmission path and by presence of noise, but the pulse out of the slicer is perfectly clean since it is produced by a local circuit affected only by the initiating impulse. The effect of the noise is not completely removed, however, because the starting time of the new pulse is shifted slightly.

The clean new pulse could be transmitted to the next station and the process there repeated to form one long circuit out of a group of separate successive stations. To hear the speech at any station, the PPM pulse is usually converted to a PLM pulse—one whose length varies with the time of occurrence. Short pulses of fixed height and varying length affect the ear in about the same way as short pulses of varying height and fixed length. In other words the response of the ear over short intervals of time is determined by the average value of what hits it—in mathematical language, the ear is an integrating device.

This all sounds so pleasant and easy that you well may wonder why

these systems have not sprouted like mushrooms all over our peaceful countryside since VJ Day. Wires strung mile after mile overhead on wooden poles or sheathed in underground cables appear clumsy and inelegant beside the flashy new method. But the fact of the matter is that although many companies have undertaken to investigate microwave radio relay systems since the war activity subsided, most of the ventures are still in the experimental stage. It is true that "anturk" installations have served the public in isolated instances, but only on a stop gap basis.

The reason why a good military installation does not necessarily transplant immediately to civilian life is mainly one of economics. Military and civilian economics have few points in common. In a war, the big objective is to win, and the cost of equipment is a secondary consideration compared with performance on the battlefield. In civilian life, the stockholders expect cash dividends on their investment, and an engineer would not be allowed to spend their funds on microwave radio equipment unless good prospects of monetary profit on the deal can be demonstrated. Careful comparison, therefore, must be made with other ways of doing the same job, not only from the standpoint of the present situation, but also on the basis of reasonable estimates of future needs. A peacetime telephone system is not built by just sending out a bunch of men on

trucks with instructions to set up their apparatus at likely looking spots thirty miles or so apart along the route. A telephone company has to buy its sites, and it has to get permission from the government to operate on specific radio frequency assignments in these localities. The latter requirement is not a one-sided proposition, for the license to use definite frequencies carries with it some assurance that disturbance by unauthorized persons operating on the same frequencies will not be allowed.

These considerations all add up to one conclusion—the telephone company will try to get as much return out of the equipment as is possible. The return is measured primarily in dollars of revenue from subscribers and this means that the system chosen should accommodate as many subscribers as will buy the service. In a well-populated area containing millions of potential customers, it would be silly to put in an eight-channel "anturk" if by using the same frequency assignments and towers but with a different design for our terminal equipment we could send and receive a thousand separate conversations all at the same time.

It may seem rather surprising, even to a well-informed radio man, that there could be such a thing as traffic congestion in the microwave band. The commercial radio broadcast band extends approximately from 0.6 to 1.6 megacycles and therefore has about one megacycle of band width. In the microwave

range, we note that as we go from a wave length of say ten centimeters to one centimeter, the frequency changes from three thousand to thirty thousand megacycles giving a band width of twenty-seven thousand megacycles. Even admitting that there are not enough assignments available in the commercial broadcast band to satisfy all applicants, would not a multiplication of the facilities by twenty-seven thousand satisfy the needs of every one, especially when we recall that the high directivity of microwaves would allow the same wave lengths to be used over and over again throughout the country? Well, one difference is that we are not talking about broadcasting now but about private telephone service between individuals, a function now accomplished in congested localities by thick cables containing hundreds of pairs of wires. It is only the prodigality of band width put at our disposal by the microwaves that makes any contemplation of their use for general telephone purposes at all possible, and we will have to squeeze all the channels we can from even the microwaves to make radio relays an efficient part of the telephone plant.

It is planned to devote another article to the most recent developments in multiplex telephony over radio links. We shall leave the subject here with some thoughts about what qualities are imperative in such systems. We can summarize a great deal in one word—toughness. Above

all else, a radio telephone link should be rugged; that is it should have a high degree of immunity to disturbances of all kinds. If we are going to risk a thousand conversations on a slender radio beam traveling over a path which must inevitably be shared to more or less extent with others, we must be sure that we are not bothered by every little vibration in the ether that happens to be passing by. It is true that antennas can be made highly directional, but this may not be enough when we are trying to receive a weak signal from a distant station while some one else is sending a high power signal from a transmitter near ours. Also we must remember that in this country subscribers expect to talk from coast to coast or even farther and that even a small bit of noise or cross-talk picked up in one radio span could grow into something intolerable if more of the same were added at each one of a hundred spans. The PPM system we have described is rugged, yes, but it has one weakness, which we hinted at before—the effect of small disturbances does persist as a small timing error in the outgoing pulse of a repeater no matter how much cleaning up we do and in a long chain of repeaters, a lot of small errors may add up.

Recent work has shown that it is possible to eliminate accumulation of error if quantization and coding are used, and it is this that we describe next month.

TO BE CONCLUDED

ETERNITY LOST

BY CLIFFORD D. SIMAK

None can blame a man whose chance for immortal life is withheld in his angry striking out at those who injured him. Particularly one slipping into the senile stage of poor attention to details and the quick temper of the senile—

Illustrated by Brush

Mr. Reeves: *The situation, as I see it, calls for well defined safeguards which would prevent continuation of life from falling under the patronage of political parties or other groups in power.*

Chairman Leonard: *You mean you are afraid it might become a political football?*

Mr. Reeves: *Not only that, sir, I am afraid that political parties might use it to continue beyond normal usefulness the lives of certain so-called elder statesmen who are needed by the party to maintain prestige and dignity in the public eye.*

From the Records of a hearing before the science subcommittee of the public policy committee of the World House of Representatives.

Senator Homer Leonard's visitors had something on their minds. They fidgeted mentally as they sat in the senator's office and drank the

senator's good whiskey. They talked, quite importantly, as was their wont, but they talked around the thing they had come to say. They circled it like a hound dog circling a coon, waiting for an opening, circling the subject to catch an opportunity that might make the message sound just a bit offhanded—as if they had just thought of it in passing and had not called purposely on the senator to say it.

It was queer, the senator told himself. For he had known these two for a good while now. And they had known him equally as long. There should be nothing they should hesitate to tell him. They had, in the past, been brutally frank about many things in his political career.

It might be, he thought, more bad news from North America, but he was as well acquainted with that bad news as they. After all, he told himself philosophically, a man cannot reasonably expect to stay in office forever. The voters, from sheer

boredom if nothing else, would finally reach the day when they would vote against a man who had served them faithfully and well. And the senator was candid enough to admit, at least to himself, that there had been times when he had served the voters of North America neither faithfully nor well.

Even at that, he thought, he had not been beaten yet. It was still several months until election time and there was a trick or two that he had never tried, political dodges that even at this late date might save the senatorial hide. Given the proper time and the proper place and he would win out yet. Timing, he told himself—proper timing is the thing that counts.

He sat quietly in his chair, a great hulk of a man, and for a single instant he closed his eyes to shut out the room and the sunlight in the window. Timing, he thought. Yes, timing and a feeling for the public, a finger on the public pulse, the ability to know ahead of time what the voter eventually will come to think—those were the ingredients of good strategy. To know ahead of time, to be ahead in thinking, so that in a week or month or year, the voters would say to one another: "You know, Bill, old Senator Leonard had it right. Remember what he said last week—or month or year—over there in Geneva. Yes, sir, he laid it on the line. There ain't much that gets past that old fox of a Leonard."

He opened his eyes a slit, keeping

them still half closed so his visitors might think he'd only had them half closed all the time. For it was impolite and a political mistake to close one's eyes when one had visitors. They might get the idea one wasn't interested. Or they might seize the opportunity to cut one's throat.

It's because I'm getting old again, the senator told himself. Getting old and drowsy. But just as smart as ever. Yes, sir, said the senator, talking to himself, just as smart and slippery as I ever was.

He saw by the tight expressions on the faces of the two that they finally were set to tell him the thing they had come to tell. All their circling and sniffing had been of no avail. Now they had to come out with it, on the line, cold turkey.

"There has been a certain matter," said Alexander Gibbs, "which has been quite a problem for the party for a long time now. We had hoped that matters would so arrange themselves that we wouldn't need to call it to your attention, senator. But the executive committee held a meeting in New York the other night and it seemed to be the consensus that we communicate it to you."

It's bad, thought the senator, even worse than I thought it might be—for Gibbs is talking in his best double-crossing manner.

The senator gave them no help. He sat quietly in his chair and held the whiskey glass in a steady hand and did not ask what it was all

about, acting as if he didn't really care.

Gibbs floundered slightly. "It's a rather personal matter, senator," he said.

"It's this life continuation business," blurted Andrew Scott.

They sat in shocked silence, all three of them, for Scott should not have said it in that way. In politics, one is not blunt and forthright, but devious and slick.

"I see," the senator said finally. "The party thinks the voters would like it better if I were a normal man who would die a normal death."

Gibbs smoothed his face of shocked surprise.

"The common people resent men living beyond their normal time," he said. "Especially—"

"Especially," said the senator, "those who have done nothing to deserve it."

"I wouldn't put it exactly that way," Gibbs protested.

"Perhaps not," said the senator. "But no matter how you say it, that is what you mean."

They sat uncomfortably in the office chairs, with the bright Geneva sunlight pouring through the windows.

"I presume," said the senator, "that the party, having found I am no longer an outstanding asset, will not renew my application for life continuation. I suppose that is what you were sent to tell me."

Might as well get it over with, he told himself grimly. Now that

it's out in the open, there's no sense in beating around the bush.

"That's just about it, senator," said Scott.

"That's exactly it," said Gibbs.

The senator heaved his great body from the chair, picked up the whiskey bottle, filled their glasses and his own.

"You delivered the death sentence very deftly," he told them. "It deserves a drink."

He wondered what they had thought that he would do. Plead with them, perhaps. Or storm around the office. Or denounce the party.

Puppets, he thought. Errand boys. Poor, scared errand boys.

They drank, their eyes on him, and silent laughter shook inside him from knowing that the liquor tasted very bitter in their mouths.

Chairman Leonard: *You are agreed then, Mr. Chapman, with the other witnesses, that no person should be allowed to seek continuation of life for himself, that it should be granted only upon application by someone else, that—*

Mr. Chapman: *It should be a gift of society to those persons who are in the unique position of being able to materially benefit the human race.*

Chairman Leonard: *That is very aptly stated, sir.*

From the Records of a hearing before the science subcommittee of the public policy

committee of the World House of Representatives.

The senator settled himself carefully and comfortably into a chair in the reception room of the Life Continuation Institute and unfolded his copy of the *North American Tribune*.

Column one said that system trade was normal, according to a report by the World Secretary of Commerce. The story went on at length to quote the secretary's report. Column two was headed by an impish box that said a new life form may have been found on Mars, but since the discoverer was a spaceman who had been more than ordinarily drunk, the report was being viewed with some skepticism. Under the box was a story reporting a list of boy and girl health champions selected by the state of Finland to be entered later in the year in the world health contest. The story in column three gave the latest information on the unstable love life of the world's richest woman.

Column four asked a question:

WHAT HAPPENED
TO DR. CARSON?
NO RECORD OF
REPORTED DEATH

The story, the senator saw, was by-lined Anson Lee and the senator chuckled dryly. Lee was up to something. He was always up to something, always ferreting out some fact that eventually was sure to prove

embarrassing to someone. Smart as a steel trap, that Lee, but a bad man to get into one's hair.

There had been, for example, that matter of the spaceship contract.

Anson Lee, said the senator underneath his breath, is a pest. Nothing but a pest.

But Dr. Carson? Who was Dr. Carson?

The senator played a little mental game with himself, trying to remember, trying to identify the name before he read the story.

Dr. Carson?

Why, said the senator, I remember now. Long time ago. A biochemist or something of the sort. A very brilliant man. Did something with colonies of soil bacteria, breeding the things for therapeutic work.

Yes, said the senator, a very brilliant man. I remember that I met him once. Didn't understand half the things he said. But that was long ago. A hundred years or more.

A hundred years ago—maybe more than that.

Why, bless me, said the senator, he must be one of us.

The senator nodded and the paper slipped from his hands and fell upon the floor. He jerked himself erect. There I go again, he told himself. Dozing. It's old age creeping up again.

He sat in his chair, very erect and quiet, like a small scared child that won't admit it's scared, and the old, old fear came tugging at his brain. Too long, he thought. I've already



waited longer than I should. Waiting for the party to renew my application and now the party won't. They've thrown me overboard. They've deserted me just when I needed them the most.

Death sentence, he had said back in the office, and that was what it was—for he couldn't last much longer. He didn't have much time. It would take a while to engineer whatever must be done. One would have to move most carefully and never tip one's hand. For there was a penalty—a terrible penalty.

The girl said to him: "Dr. Smith will see you now."

"Eh?" said the senator.

"You asked to see Dr. Dana Smith," the girl reminded him. "He will see you now."

"Thank you, miss," said the senator. "I was sitting here half dozing."

He lumbered to his feet.

"That door," said the girl.

"I know," the senator mumbled testily. "I know. I've been here many times before."

Dr. Smith was waiting.

"Have a chair, senator," he said. "Have a drink? Well, then, a cigar, maybe. What is on your mind?"

The senator took his time, getting himself adjusted to the chair. Grunting comfortably, he clipped the end off the cigar, rolled it in his mouth.

"Nothing particular on my mind," he said. "Just dropped around to pass the time of day. Have a great and abiding interest in your work here. Always have had. Associated with it from the very start."

The director nodded. "I know. You conducted the original hearings on life continuation."

The senator chuckled. "Seemed fairly simple then. There were problems, of course, and we recognized them and we tried the best we could to meet them."

"You did amazingly well," the director told him. "The code you drew up five hundred years ago has never been questioned for its fairness and the few modifications which have been necessary have dealt with minor points which no one could have anticipated."

"But it's taken too long," said the senator.

The director stiffened. "I don't understand," he said.

The senator lighted the cigar, applying his whole attention to it, flaming the end carefully so it caught even fire.

He settled himself more solidly in the chair. "It was like this," he said. "We recognized life continuation as a first step only, a rather blunder-

ing first step toward immortality. We devised the code as an interim instrument to take care of the period before immortality was available—not to a selected few, but to everyone. We viewed the few who could be given life continuation as stewards, persons who would help to advance the day when the race could be granted immortality."

"That still is the concept," Dr. Smith said, coldly.

"But the people grow impatient."

"That is just too bad," Smith told him. "The people will simply have to wait."

"As a race, they may be willing to," explained the senator. "As individuals, they're not."

"I fail to see your point, senator."

"There may not be a point," said the senator. "In late years I've often debated with myself the wisdom of the whole procedure. Life continuation is a keg of dynamite if it fails of immortality. It will breed system-wide revolt if the people wait too long."

"Have you a solution, senator?"

"No," confessed the senator. "No, I'm afraid I haven't. I've often thought that it might have been better if we had taken the people into our confidence, let them know all that was going on. Kept them up with all developments. An informed people are a rational people."

The director did not answer and the senator felt the cold weight of certainty seep into his brain.

He knows, he told himself. He knows the party has decided not to

ask that I be continued. He knows that I'm a dead man. He knows I'm almost through and can't help him any more—and he's crossed me out. He won't tell me a thing. Not the thing I want to know.

But he did not allow his face to change. He knew his face would not betray him. His face was too well trained.

"I know there is an answer," said the senator. "There's always been an answer to any question about immortality. You can't have it until there's living space. Living space to throw away, more than we ever think we'll need, and a fair chance to find more of it if it's ever needed."

Dr. Smith nodded. "That's the answer, senator. The only answer I can give."

He sat silent for a moment, then he said: "Let me assure you on one point, senator. When Extrasolar Research finds the living space, we'll have the immortality."

The senator heaved himself out of the chair, stood planted solidly on his feet.

"It's good to hear you say that, doctor," he said. "It is very heartening. I thank you for the time you gave me."

Out on the street, the senator thought bitterly:

They have it now. They have immortality. All they're waiting for is the living space and another hundred years will find that. Another hundred years will simply have to find it.

Another hundred years, he told

himself, just one more continuation, and I would be in for good and all.

Mr. Andrews: *We must be sure there is a divorcement of life continuation from economics. A man who has money must not be allowed to purchase additional life, either through the payment of money or the pressure of influence, while another man is doomed to die a natural death simply because he happens to be poor.*

Chairman Leonard: *I don't believe that situation has ever been in question.*

Mr. Andrews: *Nevertheless, it is a matter which must be emphasized again and again. Life continuation must not be a commodity to be sold across the counter at so many dollars for each added year of life.*

From the Records of a hearing before the science subcommittee of the public policy committee of the World House of Representatives.

The senator sat before the chessboard and idly worked at the problem. Idly, since his mind was on other things than chess.

So they had immortality, had it and were waiting, holding it a secret until there was assurance of sufficient living space. Holding it a secret from the people and from the government and from the men and women who had spent many life-

times working for the thing which already had been found.

For Smith had spoken, not as a man who was merely confident, but as a man who knew. When Extrasolar Research finds the living space, he'd said, we'll have immortality. Which meant they had it now. Immortality was not predictable. You would not know you'd have it; you would only know if and when you had it.

The senator moved a bishop and saw that he was wrong. He slowly pulled it back.

Living space was the key, and not living space alone, but economic living space, self-supporting in terms of food and other raw materials, but particularly in food. For if living space had been all that mattered, Man had it in Mars and Venus and the moons of Jupiter. But not one of those worlds was self-supporting. They did not solve the problem.

Living space was all they needed and in a hundred years they'd have that. Another hundred years was all that anyone would need to come into possession of the common human heritage of immortality.

Another continuation would give me that hundred years, said the senator, talking to himself. A hundred years and some to spare, for this time I'll be careful of myself. I'll lead a cleaner life. Eat sensibly and cut out liquor and tobacco and the woman-chasing.

There were ways and means, of course. There always were. And

he would find them, for he knew all the dodges. After five hundred years in world government, you got to know them all. If you didn't know them, you simply didn't last.

Mentally he listed the possibilities as they occurred to him.

ONE: A person could engineer a continuation for someone else and then have that person assign the continuation to him. It would be costly, of course, but it might be done.

You'd have to find someone you could trust and maybe you couldn't find anyone you could trust that far—for life continuation was something hard to come by. Most people, once they got it, wouldn't give it back.

Although on second thought, it probably wouldn't work. For there'd be legal angles. A continuation was a gift of society to one specific person to be used by him alone. It would not be transferable. It would not be legal property. It would not be something that one owned. It could not be bought or sold, it could not be assigned.

If the person who had been granted a continuation died before he got to use it—died of natural causes, of course, of wholly natural causes that could be provable—why, maybe, then— But still it wouldn't work. Not being property, the continuation would not be part of one's estate. It could not be bequeathed. It most likely would revert to the issuing agency.

Cross that one off, the senator told himself.

TWO: He might travel to New York and talk to the party's executive secretary. After all, Gibbs and Scott were mere messengers. They had their orders to carry out the dictates of the party and that was all. Maybe if he saw someone in authority—

But, the senator scolded himself, that is wishful thinking. The party's through with me. They've pushed their continuation racket as far as they dare push it and they have wrangled about all they figure they can get. They don't dare ask for more and they need my continuation for someone else most likely—someone who's a comer; someone who has vote appeal.

And I, said the senator, am an old has-been.

Although I'm a tricky old rascal, and ornery if I have to be, and slippery as five hundred years of public life can make one.

After that long, said the senator, parenthetically, you have no more illusions, not even of yourself.

I couldn't stomach it, he decided. I couldn't live with myself if I went crawling to New York—and a thing has to be pretty bad to make me feel like that. I've never crawled before and I'm not crawling now, not even for an extra hundred years and a shot at immortality.

Cross that one off, too, said the senator.

THREE: Maybe someone could be bribed.

Of all the possibilities, that sounded the most reasonable. There always was someone who had a certain price and always someone else who could act as intermediary. Naturally, a world senator could not get mixed up directly in a deal of that sort.

It might come a little high, but what was money for? After all, he reconciled himself, he'd been a frugal man of sorts and had been able to lay away a wad against such a day as this.

The senator moved a rook and it seemed to be all right, so he left it there.

Of course, once he managed the continuation, he would have to disappear. He couldn't flaunt his triumph in the party's face. He couldn't take a chance of someone asking how he'd been continued. He'd have to become one of the people, seek to be forgotten, live in some obscure place and keep out of the public eye.

Norton was the man to see. No matter what one wanted, Norton was the man to see. An appointment to be secured, someone to be killed, a concession on Venus or a spaceship contract—Norton did the job. All quietly and discreetly and no questions asked. That is, if you had the money. If you didn't have the money, there was no use of seeing Norton.

Otto came into the room on silent feet.

"A gentleman to see you, sir," he said.

The senator stiffened upright in his chair.

"What do you mean by sneaking up on me?" he shouted. "Always pussyfooting. Trying to startle me. After this you cough or fall over a chair or something so I'll know that you're around."

"Sorry, sir," said Otto. "There's a gentleman here. And there are those letters on the desk to read."

"I'll read the letters later," said the senator.

"Be sure you don't forget," Otto told him, stiffly.

"I never forget," said the senator. "You'd think I was getting senile, the way you keep reminding me."

"There's a gentleman to see you," Otto said patiently. "A Mr. Lee."

"Anson Lee, perhaps."

Otto sniffed. "I believe that was his name. A newspaper person, sir."

"Show him in," said the senator.

He sat stolidly in his chair and thought: Lee's found out about it. Somehow he's ferreted out the fact the party's thrown me over. And he's here to crucify me.

He may suspect, but he cannot know. He may have heard a rumor, but he can't be sure. The party would keep mum, must necessarily keep mum, since it can't openly admit its traffic in life continuation. So Lee, having heard a rumor, had come to blast it out of me, to catch me by surprise and trip me up with words.

I must not let him do it, for once the thing is known, the wolves will come in packs knee deep.

Lee was walking into the room and the senator rose and shook his hand.

"Sorry to disturb you, senator," Lee told him, "but I thought maybe you could help me."

"Anything at all," the senator said, affably. "Anything I can. Sit down, Mr. Lee."

"Perhaps you read my story in the morning paper," said Lee. "The one on Dr. Carson's disappearance."

"No," said the senator. "No, I'm afraid I—"

He rumbled to a stop, astounded.

He hadn't read the paper!

He had forgotten to read the paper!

He always read the paper. He never failed to read it. It was a solemn rite, starting at the front and reading straight through to the back, skipping only those sections which long ago he'd found not to be worth the reading.

He'd had the paper at the institute and he had been interrupted when the girl told him that Dr. Smith would see him. He had come out of the office and he'd left the paper in the reception room.

It was a terrible thing. Nothing, absolutely nothing, should so upset him that he forgot to read the paper.

"I'm afraid I didn't read the story," the senator said lamely. He simply couldn't force himself to admit that he hadn't read the paper.

"Dr. Carson," said Lee, "was a biochemist, a fairly famous one. He died ten years or so ago, according to an announcement from a little village in Spain, where he had gone to live. But I have reason to believe, senator, that he never died at all, that he may still be living."

"Hiding?" asked the senator.

"Perhaps," said Lee. "Although there seems no reason that he should. His record is entirely spotless."

"Why do you doubt he died, then?"

"Because there's no death certificate. And he's not the only one who died without benefit of certificate."

"Hm-m-m," said the senator.

"Galloway, the anthropologist, died five years ago. There's no certificate. Henderson, the agricultural expert, died six years ago. There's no certificate. There are a dozen more I know of and probably many that I don't."

"Anything in common?" asked the senator. "Any circumstances that might link these people?"

"Just one thing," said Lee. "They were all continuators."

"I see," said the senator. He clasped the arms of his chair with a fierce grip to keep his hands from shaking.

"Most interesting," he said. "Very interesting."

"I know you can't tell me anything officially," said Lee, "but I thought you might give me a fill-in, an off-the-record background. You wouldn't let me quote you, of course,

but any clues you might give me, any hint at all—"

He waited hopefully.

"Because I've been close to the Life Continuation people?" asked the senator.

Lee nodded. "If there's anything to know, you know it, senator. You headed the committee that held the original hearings on life continuation. Since then you've held various other congressional posts in connection with it. Only this morning you saw Dr. Smith."

"I can't tell you anything," mumbled the senator. "I don't know anything. You see, it's a matter of policy—"

"I had hoped you would help me, senator."

"I can't," said the senator. "You'll never believe it, of course, but I really can't."

He sat silently for a moment and then he asked a question: "You say all these people you mention were continuators. You checked, of course, to see if their applications had been renewed?"

"I did," said Lee. "There are no renewals for any one of them—at least no records of renewals. Some of them were approaching death limit and they actually may be dead by now, although I doubt that any of them died at the time or place announced."

"Interesting," said the senator. "And quite a mystery, too."

Lee deliberately terminated the discussion. He gestured at the chess-

board. "Are you an expert, senator?"

The senator shook his head. "The game appeals to me. I fool around with it. It's a game of logic and also a game of ethics. You are perforce a gentleman when you play it. You observe certain rules of correctness of behavior."

"Like life, senator?"

"Like life should be," said the senator. "When the odds are too terrific, you resign. You do not force your opponent to play out to the bitter end. That's ethics. When you see that you can't win, but that you have a fighting chance, you try for the next best thing—a draw. That's logic."

Lee laughed, a bit uncomfortably. "You've lived according to those rules, senator?"

"I've done my best," said the senator, trying to sound humble.

Lee rose. "I must be going, senator."

"Stay and have a drink."

Lee shook his head. "Thanks, but I have work to do."

"I owe you a drink," said the senator. "Remind me of it sometime."

For a long time after Lee left, Senator Homer Leonard sat unmoving in his chair.

Then he reached out a hand and picked up a knight to move it, but his fingers shook so that he dropped it and it clattered on the board.

Any person who gains the gift of life continuation by illegal or extra-

legal means, without bona fide recommendation or proper authorization through recognized channels, shall be, in effect, excommunicated from the human race. The facts of that person's guilt, once proved, shall be published by every means at humanity's command throughout the Earth and to every corner of the Earth so that all persons may know and recognize him. To further insure such recognition and identification, said convicted person must wear at all times, conspicuously displayed upon his person, a certain badge which shall advertise his guilt. While he may not be denied the ordinary basic requirements of life, such as food, adequate clothing, a minimum of shelter and medical care, he shall not be allowed to partake of or participate in any of the other refinements of civilization. He will not be allowed to purchase any item in excess of the barest necessities for the preservation of life, health and decency; he shall be barred from all endeavors and normal associations of humankind; he shall not have access to nor benefit of any library, lecture hall, amusement place or other facility, either private or public, designed for instruction, recreation or entertainment. Nor may any person, under certain penalties hereinafter set forth, knowingly converse with him or establish any human relationship whatsoever with him. He will be suffered to live out his life within the framework of the human community, but to all intent and purpose

he will be denied all the privileges and obligations of a human being. And the same provisions as are listed above shall apply in full and equal force to any person or persons who shall in any way knowingly aid such a person to obtain life continuation by other than legal means.

From the Code of Life Continuation.

"What you mean," said J. Barker Norton, "is that the party all these years has been engineering renewals of life continuation for you. Paying you off for services well rendered."

The senator nodded miserably.

"And now that you're on the verge of losing an election, they figure you aren't worth it any longer and have refused to ask for a renewal."

"In curbstone language," said the senator, "that sums it up quite neatly."

"And you come running to me," said Norton. "What in the world do you think I can do about it?"

The senator leaned forward. "Let's put it on a business basis, Norton. You and I have worked together before."

"That's right," said Norton. "Both of us cleaned up on that spaceship deal."

The senator said: "I want another hundred years and I'm willing to pay for it. I have no doubt you can arrange it for me."

"How?"

"I wouldn't know," said the senator. "I'm leaving that to you. I don't care how you do it."

Norton leaned back in his chair and made a tent out of his fingers.

"You figure I could bribe someone to recommend you. Or bribe some continuation technician to give you a renewal without authorization."

"Those are a pair of excellent ideas," agreed the senator.

"And face excommunication if I were found out," said Norton. "Thanks, senator, I'm having none of it."

The senator sat impassively, watching the face of the man across the desk.

"A hundred thousand," the senator said quietly.

Norton laughed at him.

"A half a million, then."

"Remember that excommunication, senator. It's got to be worth my while to take a chance like that."

"A million," said the senator. "And that's absolutely final."

"A million now," said Norton. "Cold cash. No receipt. No record of the transaction. Another million when and if I can deliver."

The senator rose slowly to his feet, his face a mask to hide the excitement that was stirring in him. The excitement and the naked surge of exultation. He kept his voice level.

"I'll deliver that million before the week is over."

Norton said: "I'll start looking into things."

On the street outside, the senator's step took on a jauntiness it had not

known in years. He walked along briskly, flipping his cane.

Those others, Carson and Gallo-way and Henderson, had disappeared, exactly as he would have to disappear once he got his extra hundred years. They had arranged to have their own deaths announced and then had dropped from sight, living against the day when immortality would be a thing to be had for the simple asking.

Somewhere, somehow, they had got a new continuation, an unauthorized continuation, since a renewal was not listed in the records. Someone had arranged it for them. More than likely Norton.

But they had bungled. They had tried to cover up their tracks and had done no more than call attention to their absence.

In a thing like this, a man could not afford to blunder. A wise man, a man who took the time to think things out, would not make a blunder.

The senator pursed his flabby lips and whistled a snatch of music.

Norton was a gouger, of course. Pretending that he couldn't make arrangements, pretending he was afraid of excommunication, jacking up the price.

The senator grinned wryly. It would take almost every dime he had, but it was worth the price.

He'd have to be careful, getting together that much money. Some from one bank, some from another, collecting it piecemeal by withdrawals and by cashing bonds, float-

ing a few judicious loans so there'd not be too many questions asked.

He bought a paper at the corner and hailed a cab. Settling back in the seat, he creased the paper down its length and started in on column one. Another health contest. This time in Australia.

Health, thought the senator, they're crazy on this health business. Health centers. Health cults. Health clinics.

He skipped the story, moved on to column two.

The head said:

SIX SENATORS POOR BETS FOR RE-ELECTION

The senator snorted in disgust. One of the senators, of course, would be himself.

He wadded up the paper and jammed it in his pocket.

Why should he care? Why knock himself out to retain a senate seat he could never fill? He was going to grow young again, get another chance at life. He would move to some far part of the earth and be another man.

Another man. He thought about it and it was refreshing. Dropping all the old dead wood of past association, all the ancient accumulation of responsibilities.

Norton had taken on the job. Norton would deliver.

Mr. Miller: *What I want to know is this: Where do we stop? You*

give this life continuation to a man and he'll want his wife and kids to have it. And his wife will want her Aunt Minnie to have it and the kids will want the family dog to have it and the dog will want—

Chairman Leonard: *You're facetious, Mr. Miller.*

Mr. Miller: *I don't know what that big word means, mister. You guys here in Geneva talk fancy with them six-bit words and you get the people all balled up. It's time the common people got in a word of common sense.*

From the Records of a hearing before the science subcommittee of the public policy committee of the World House of Representatives.

"Frankly," Norton told him, "it's the first time I ever ran across a thing I couldn't fix. Ask me anything else you want to, senator, and I'll rig it up for you."

The senator sat stricken. "You mean you couldn't— But, Norton, there was Dr. Carson and Galloway and Henderson. Someone took care of them."

Norton shook his head. "Not I. I never heard of them."

"But someone did," said the senator. "They disappeared—"

His voice trailed off and he slumped deeper in the chair and the truth suddenly was plain—the truth he had failed to see.

A blind spot, he told himself. A blind spot!

They had disappeared and that was all he knew. They had published their own deaths and had not died, but had disappeared.

He had assumed they had disappeared because they had got an illegal continuation. But that was sheer wishful thinking. There was no foundation for it, no fact that would support it.

There could be other reasons, he told himself, many other reasons why a man would disappear and seek to cover up his tracks with a death report.

But it had tied in so neatly!

They were continuators whose applications had not been renewed. Exactly as he was a continuator whose application would not be renewed.

They had dropped out of sight. Exactly as he would have to drop from sight once he gained another lease on life.

It had tied in so neatly—and it had been all wrong.

"I tried every way I knew," said Norton. "I canvassed every source that might advance your name for continuation and they laughed at me. It's been tried before, you see, and there's not a chance of getting it put through. Once your original sponsor drops you, you're automatically cancelled out.

"I tried to sound out technicians who might take a chance, but they're incorruptible. They get paid off in added years for loyalty and they're



not taking any chance of trading years for dollars."

"I guess that settles it," the senator said wearily. "I should have known."

He heaved himself to his feet and faced Norton squarely. "You are telling me the truth," he pleaded. "You aren't just trying to jack up the price a bit."

Norton stared at him, almost unbelieving. "Jack up the price! Senator, if I had put this through,

I'd have taken your last penny. Want to know how much you're worth? I can tell you within a thousand dollars."

He waved a hand at a row of filing cases ranged along the wall.

"It's all there, senator. You and all the other big shots. Complete files on every one of you. When a man comes to me with a deal like yours, I look in the files and strip him to the bone."

"I don't suppose there's any use

of asking for some of my money back?"

Norton shook his head. "Not a ghost. You took your gamble, senator. You can't even prove you paid me. And, beside, you still have plenty left to last you the few years you have to live."

The senator took a step toward the door, then turned back.

"Look, Norton, I can't die! Not now. Just one more continuation and I'd be—"

The look on Norton's face stopped him in his tracks. The look he'd glimpsed on other faces at other times, but only glimpsed. Now he stared at it—at the naked hatred of a man whose life is short for the man whose life is long.

"Sure, you can die," said Norton. "You're going to. You can't live forever. Who do you think you are!"

The senator reached out a hand and clutched the desk.

"But you don't understand."

"You've already lived ten times as long as I have lived," said Norton, coldly, measuring each word, "and I hate your guts for it. Get out of here, you sniveling old fool, before I throw you out."

Dr. Barton: *You may think that you would confer a boon on humanity with life continuation, but I tell you, sir, that it would be a curse. Life would lose its value and its meaning if it went on forever, and if you have life continuation now, you eventually must*

stumble on immortality. And when that happens, sir, you will be compelled to set up boards of review to grant the boon of death. The people, tired of life, will storm your hearing rooms to plead for death.

Chairman Leonard: *It would banish uncertainty and fear.*

Dr. Barton: *You are talking of the fear of death. The fear of death, sir, is infantile.*

Chairman Leonard: *But there are benefits—*

Dr. Barton: *Benefits, yes. The benefit of allowing a scientist the extra years he needs to complete a piece of research; a composer an additional lifetime to complete a symphony. Once the novelty wore off, men in general would accept added life only under protest, only as a duty.*

Chairman Leonard: *You're not very practical-minded, doctor.*

Dr. Barton: *But I am. Extremely practical and down to earth. Man must have newness. Man cannot be bored and live. How much do you think there would be left to look forward to after the millionth woman, the billionth piece of pumpkin pie?*

From the Records of the hearing before the science subcommittee of the public policy committee of the World House of Representatives.

So Norton hated him.
As all people of normal lives

must hate, deep within their souls, the lucky ones whose lives went on and on.

A hatred deep and buried, most of the time buried. But sometimes breaking out, as it had broken out of Norton.

Resentment, tolerated because of the gently, skillfully fostered hope that those whose lives went on might some day make it possible that the lives of all, barring violence or accident or incurable disease, might go on as long as one would wish.

I can understand it now, thought the senator, for I am one of them. I am one of those whose lives will not continue to go on, and I have even fewer years than the most of them.

He stood before the window in the deepening dusk and saw the lights come out and the day die above the unbelievably blue waters of the far-famed lake.

Beauty came to him as he stood there watching, beauty that had gone unnoticed through all the later years. A beauty, and a softness and a feeling of being one with the city lights and the last faint gleam of day above the darkening waters.

Fear? The senator admitted it.

Bitterness? Of course.

Yet, despite the fear and bitterness, the window held him with the scene it framed.

Earth and sky and water, he thought. I am one with them. Death has made me one with them. For death brings one back to the elementals, to the soil and trees, to

the clouds and sky and the sun dying in the welter of its blood in the crimson west.

This is the price we pay, he thought, that the race must pay, for its life eternal—that we may not be able to assess in their true value the things that should be dearest to us; for a thing that has no ending, a thing that goes on forever, must have decreasing value.

Rationalization, he accused himself. Of course, you're rationalizing. You want another hundred years as badly as you ever did. You want a chance at immortality. But you can't have it and you trade eternal life for a sunset seen across a lake and it is well you can. It is a blessing that you can.

The senator made a rasping sound within his throat.

Behind him the telephone came to sudden life and he swung around. It chirred at him again. Feet pattered down the hall and the senator called out: "I'll get it, Otto."

He lifted the receiver. "New York calling," said the operator. "Senator Leonard, please."

"This is Leonard."

Another voice broke in. "Senator, this is Gibbs."

"Yes," said the senator. "The executioner."

"I called you," said Gibbs, "to talk about the election."

"What election?"

"The one here in North America. The one you're running in. Remember?"

"I am an old man," said the sena-

tor, "and I'm about to die. I'm not interested in elections."

Gibbs practically chattered. "But you have to be. What's the matter with you, senator? You have to do something. Make some speeches, make a statement, come home and stump the country. The party can't do it all alone. You have to do some of it yourself."

"I will do something," declared the senator. "Yes, I think that finally I'll do something."

He hung up and walked to the writing desk, snapped on the light. He got paper out of a drawer and took a pen out of his pocket.

The telephone went insane and he paid it no attention. It rang on and on and finally Otto came and answered.

"New York calling, sir," he said.

The senator shook his head and he heard Otto talking softly and the phone did not ring again.

The senator wrote:

To Whom It May Concern:

Then crossed it out.

He wrote:

A Statement to the World:

And crossed it out.

He wrote:

A Statement by Senator Homer Leonard:

He crossed that out, too.

He wrote:

Five centuries ago the people of the world gave into the hands of a few trusted men and women the gift of continued life in the hope and belief that they would work to advance the day when longer life

spans might be made possible for the entire population.

From time to time, life continuation has been granted additional men and women, always with the implied understanding that the gift was made under the same conditions—that the persons so favored should work against the day when each inhabitant of the entire world might enter upon a heritage of near-eternity.

Through the years some of us have carried that trust forward and have lived with it and cherished it and bent every effort toward its fulfillment.

Some of us have not.

Upon due consideration and searching examination of my own status in this regard, I have at length decided that I no longer can accept further extension of the gift.

Human dignity requires that I be able to meet my fellow man upon the street or in the byways of the world without flinching from him. This I could not do should I continue to accept a gift to which I have no claim and which is denied to other men.

The senator signed his name, neatly, carefully, without the usual flourish.

"There," he said, speaking aloud in the silence of the night-filled room, "that will hold them for a while."

Feet padded and he turned around.

"It's long past your usual bedtime, sir," said Otto.

The senator rose clumsily and his aching bones protested. Old, he thought. Growing old again. And it would be so easy to start over, to regain his youth and live another lifetime. Just the nod of someone's head, just a single pen stroke and he would be young again.

"This statement, Otto," he said. "Please give it to the press."

"Yes, sir," said Otto. He took the paper, held it gingerly.

"Tonight," said the senator.

"Tonight, sir? It is rather late."

"Nevertheless, I want to issue it tonight."

"It must be important, sir."

"It's my resignation," said the senator.

"Your resignation! From the senate, sir!"

"No," said the senator. "From life."

Mr. Michaelson: *As a churchman, I cannot think otherwise than that the proposal now before you gentlemen constitutes a perversion of God's law. It is not within the province of man to say a man may live beyond his allotted time.*

Chairman Leonard: *I might ask you this: How is one to know when a man's allotted time has come to an end? Medicine has prolonged the lives of many persons. Would you call a physician a perverter of God's law?*

Mr. Michaelson: *It has become apparent through the testimony given here that the eventual aim of continuing research is immor-*

tality. Surely you can see that physical immortality does not square with the Christian concept. I tell you this, sir: You can't fool God and get away with it.

From the Records of a hearing before the science subcommittee of the public policy committee of the World House of Representatives.

Chess is a game of logic.

But likewise a game of ethics.

You do not shout and you do not whistle, nor band the pieces on the board, nor twiddle your thumbs, nor move a piece then take it back again.

When you're beaten, you admit it. You do not force your opponent to carry on the game to absurd lengths. You resign and start another game if there is time to play one. Otherwise, you just resign and you do it with all the good grace possible. You do not knock all the pieces to the floor in anger. You do not get up abruptly and stalk out of the room. You do not reach across the board and punch your opponent in the nose.

When you play chess you are, or you are supposed to be, a gentleman.

The senator lay wide-awake, staring at the ceiling.

You do not reach across the board and punch your opponent in the nose. You do not knock the pieces to the floor.

But this isn't chess, he told himself, arguing with himself. This

isn't chess; this is life and death. A dying thing is not a gentleman. It does not curl up quietly and die of the hurt inflicted. It backs into a corner and it fights, it lashes back and does all the hurt it can.

And I am hurt. I am hurt to death.

And I have lashed back. I have lashed back, most horribly.

They'll not be able to walk down the street again, not ever again, those gentlemen who passed the sentence on me. For they have no more claim to continued life than I and the people now will know it. And the people will see to it that they do not get it.

I will die, but when I go down I'll pull the others with me. They'll know I pulled them down, down with me into the pit of death. That's the sweetest part of all—they'll know who pulled them down and they won't be able to say a word about it. They can't even contradict the noble things I said.

Someone in the corner said, some voice from some other time and place: *You're no gentleman, senator. You fight a dirty fight.*

Sure I do, said the senator. They fought dirty first. And politics always was a dirty game.

Remember all that fine talk you dished out to Lee the other day?

That was the other day, snapped the senator.

You'll never be able to look a chessman in the face again, said the voice in the corner.

I'll be able to look my fellow men

in the face, however, said the senator.

Will you? asked the voice.

And that, of course, was the question. Would he?

I don't care, the senator cried desperately. I don't care what happens. They played a lousy trick on me. They can't get away with it. I'll fix their clocks for them. I'll—

Sure, you will, said the voice, mocking.

Go away, shrieked the senator. Go away and leave me. Let me be alone.

You are alone, said the thing in the corner. *You are more alone than any man has ever been before.*

Chairman Leonard: *You represent an insurance company, do you not, Mr. Markely? A big insurance company.*

Mr. Markely: *That is correct.*

Chairman Leonard: *And every time a person dies, it costs your company money?*

Mr. Markely: *Well, you might put it that way if you wished, although it is scarcely the case—*

Chairman Leonard: *You do have to pay out benefits on deaths, don't you?*

Mr. Markely: *Why, yes, of course we do.*

Chairman Leonard: *Then I can't understand your opposition to life continuation. If there were fewer deaths, you'd have to pay fewer benefits.*

Mr. Markely: *All very true, sir. But if people had reason to be-*

lieve they would live virtually forever, they'd buy no life insurance.

Chairman Leonard: *Oh, I see. So that's the way it is.*

From the Records of a hearing before the science subcommittee of the public policy committee of the World House Of Representatives.

The senator awoke. He had not been dreaming, but it was almost as if he had awakened from a bad dream—or awakened to a bad dream—and he struggled to go back to sleep again, to gain the Nirvana of unawareness, to shut out the harsh reality of existence, to dodge the shame of knowing who and what he was.

But there was someone stirring in the room, and someone spoke to him and he sat upright in bed, stung to wakefulness by the happiness and something else that was almost worship which the voice held.

"It's wonderful, sir," said Otto. "There have been phone calls all night long. And the telegrams and radiograms still are stacking up."

The senator rubbed his eyes with pudgy fists.

"Phone calls, Otto? People sore at me?"

"Some of them were, sir. Terribly angry, sir. But not too many of them. Most of them were happy and wanted to tell you what a great thing you'd done. But I told them

you were tired and I could not waken you."

"Great thing?" said the senator. "What great thing have I done?"

"Why, sir, giving up life continuation. One man said to tell you it was the greatest example of moral courage the world had ever known. He said all the common people would bless you for it. Those were his very words. He was very solemn, sir."

The senator swung his feet to the floor, sat on the edge of the bed, scratching at his ribs.

It was strange, he told himself, how a thing would turn out sometimes. A heel at bedtime and a hero in the morning.

"Don't you see, sir," said Otto, "you have made yourself one of the common people, one of the short-lived people. No one has ever done a thing like that before."

"I was one of the common people," said the senator, "long before I wrote that statement. And I didn't make myself one of them. I was forced to become one of them, much against my will."

But Otto, in his excitement, didn't seem to hear.

He rattled on: "The newspapers are full of it, sir. It's the biggest news in years. The political writers are chuckling over it. They're calling it the smartest political move that was ever pulled. They say that before you made the announcement you didn't have a chance of being re-elected senator and now, they say,

you can be elected president if you just say the word."

The senator sighed. "Otto," he said, "please hand me my pants. It is cold in here."

Otto handed him his trousers. "There's a newspaperman waiting in the study, sir. I held all the others off, but this one sneaked in the back way. You know him, sir, so I let him wait. He is Mr. Lee."

"I'll see him," said the senator.

So it was a smart political move, was it? Well, maybe so, but after a day or so, even the surprised political experts would begin to wonder about the logic of a man literally giving up his life to be re-elected to a senate seat.

Of course the common herd would love it, but he had not done it for applause. Although, so long as the people insisted upon thinking of him as great and noble, it was all right to let them go on thinking so.

The senator jerked his tie straight and buttoned his coat. He went into the study and Lee was waiting for him.

"I suppose you want an interview," said the senator. "Want to know why I did this thing?"

Lee shook his head. "No, senator, I have something else. Something you should know about. Remember our talk last week? About the disappearances."

The senator nodded.

"Well, I have something else. You wouldn't tell me anything last week, but maybe now you will. I've checked, senator, and I've found

this—the health winners are disappearing, too. More than eighty percent of those who participated in the finals of the last ten years have disappeared."

"I don't understand," said the senator.

"They're going somewhere," said Lee. "Something's happening to them. Something's happening to two classes of our people—the continuators and the healthiest youngsters."

"Wait a minute," gasped the senator. "Wait a minute, Mr. Lee."

He groped his way to the desk, grasped its edge and lowered himself into a chair.

"There is something wrong, senator?" asked Lee.

"Wrong?" mumbled the senator. "Yes, there must be something wrong."

"They've found living space," said Lee, triumphantly. "That's it, isn't it? They've found living space and they're sending out the pioneers."

The senator shook his head. "I don't know, Lee. I have not been informed. Check Extrasolar Research. They're the only ones who know—and they wouldn't tell you."

Lee grinned at him. "Good day, senator," he said. "Thanks so much for helping."

Dully, the senator watched him go.

Living space? Of course, that was it.

They had found living space and

Extrasolar Research was sending out handpicked pioneers to prepare the way. It would take years of work and planning before the discovery could be announced. For once announced, world government must be ready to confer immortality on a mass production basis, must have ships available to carry out the hordes to the far, new worlds. A premature announcement would bring psychological and economic disruption that would make the government a shambles. So they would work very quietly, for they must work quietly.

His eyes found the little stack of letters on one corner of the desk and he remembered, with a shock of guilt, that he had meant to read them. He had promised Otto that he would and then he had forgotten.

I keep forgetting all the time, said the senator. I forget to read my paper and I forget to read my letters and I forget that some men are loyal and morally honest instead of slippery and slick. And I indulge in wishful thinking and that's the worst of all.

Continuators and health champions disappearing. Sure, they're disappearing. They're headed for new worlds and immortality.

And I . . . I . . . if only I had kept my big mouth shut —

The phone chirped and he picked it up.

"This is Sutton at Extrasolar Research," said an angry voice.

"Yes, Dr. Sutton," said the senator. "It's nice of you to call."

"I'm calling in regard to the invitation that we sent you last week," said Sutton. "In view of your statement last night, which we feel very keenly is an unjust criticism, we are withdrawing it."

"Invitation," said the senator. "Why, I didn't—"

"What I can't understand," said Sutton, "is why, with the invitation in your pocket, you should have acted as you did."

"But," said the senator, "but, doctor—"

"Good-by, senator," said Sutton.

Slowly the senator hung up. With a fumbling hand, he reached out and picked up the stack of letters.

It was the third one down. The return address was Extrasolar Research and it had been registered and sent special delivery and it was marked both PERSONAL and IMPORTANT.

The letter slipped out of the senator's trembling fingers and fluttered to the floor. He did not pick it up.

It was too late now, he knew, to do anything about it.

THE END

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JULIUS UNGER • Box 35, Brooklyn 4, New York

BOOK REVIEW

"The Checklist of Fantastic Literature"; edited by Everett F. Bleiler, with a preface by Melvin Korshak. Shasta Publishers, Chicago, Ill. 475 pages, \$6.00

At first glance the job of reviewing a checklist of books looks somewhat like an attempt to write a review of the new edition of the Manhattan Telephone Directory. But the first glance is deceptive, there are some differences. When, some time in the future, the "Checklist" will be as commonplace on a librarian's desk as the Telephone Directory is right now, there no longer will be a need for a review. But this day has not yet arrived and the story of the "Checklist" bears a closer resemblance to the story of the first Telephone Directory.

The "Checklist" comprises a little over five thousand titles of books, ghost, fantasy, science fiction and weird arranged with complete bibliographical information, and equipped with a double index, one by author and one by title. The job of collecting these five thousand titles must have been enormous, about sixty collectors of fantasy and science fiction submitted their lists which were then assembled and correlated by three well-known fantasy specialists, T. E. Dikty, Erle Korshak and Mark Reinsberg. After that was done, the editor,

Everett F. Bleiler, checked every entry to insure bibliographical correctness. The result is something which is indispensable to librarians, book dealers and especially antiquarians. It is almost unnecessary to remark that this is the first booklist of this type, preceded by nothing but lists in "fan" magazines.

Since publication of the checklist I have heard many remarks about missing titles and I have seen quite a number of entries in secondhand booklists stating triumphantly: "this title not listed in the Shasta 'Checklist'." This does not surprise me at all, the first bibliography of anything is bound to have holes. And since the publisher of every book optimistically counts on repeated editions there exists a natural opportunity not only of listing the new books in the field but also those older ones not mentioned before.

My personal criticism is rather that I found a number of titles listed which, in my opinion, should not have been included. Oh yes, they do have some fantasy content, but it is of a density that one might just as well include arctic snow in a list of iron ores. Arctic snow does have a slight—meteoritic—iron content but the man who wants iron won't be satisfied with the amount. Neither will the fantasy collector be satisfied with the amount of fantasy in some of the listed titles.

Another point at which I urgently suggest improvement is one which has been specifically denied by the editor in his introduction. The user of the "Checklist" has no idea what a given title is about, unless it so happens that the type of story can be guessed from the title. Since most collectors cannot possibly collect the whole field of fantasy, partly because of the problem of shelf space in their homes and also—as a remote possibility—for financial reasons, they are bound to specialize. There are presumably collectors of ghost stories and of vampire stories, of social utopias and of technological utopias, of interplanetary stories and of time travel stories. These

specialists are left floundering by the "Checklist," opening it at random I find "King, Basil, 'Abraham's Bosom,' Harper; New York 1918." Not knowing it I am at a loss to decide whether it is "weird," satire, utopian or what. But this little item of knowledge is what makes a specialized collector decide whether he wants to hunt for "Abraham's Bosom" or not.

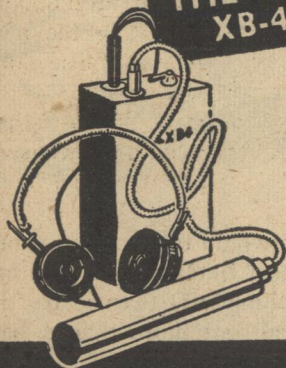
It would need very little to remedy this, usually one word would do, in rare cases two words would be needed. And once in a hundred pages three words. I live in hopes that these words will be added, beginning with the second edition.

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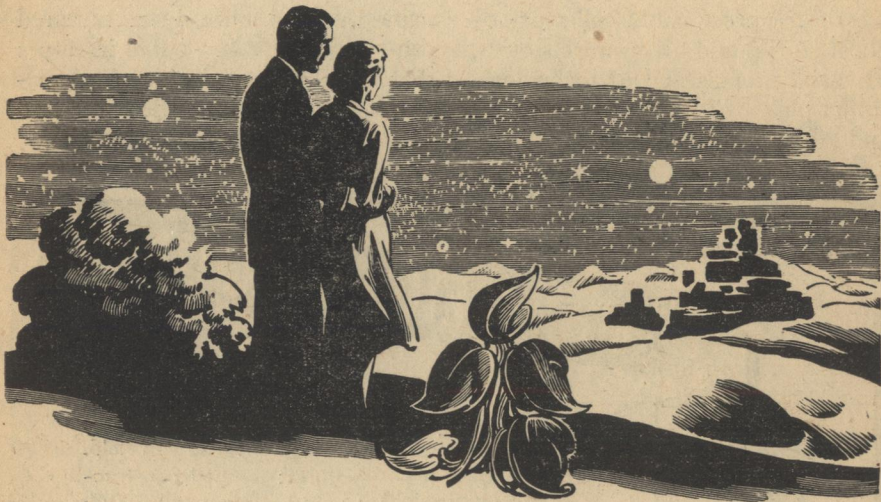
DENVER 4, COLORADO

ADAPTATION

BY JOHN BEYNON

The essential point is, Man was made for Earth, and not for the other planets. And if Man insists on inhabiting the other planets, certain—adaptations must be made.

Illustrated by Orban



The prospect of being stuck on Mars for a while did not worry Marilyn Godalpin a lot—not at first, anyway. She had been near the piece of desert that they called a landing field when the *Andromeda* came in to a bad landing. After that it did not surprise her at all when the engineers said that with the limited facilities at the settlement

the repairs would take at least three months, most likely four. The astonishing thing was that no one in the ship had got more than a bad shaking.

It still did not worry her when they explained to her, with simplified astronautics, that that meant there could be no take-off for the *Andromeda* for at least eight months on

account of the relative position of Earth. But she did get a bit fussed when she discovered that she was going to have a baby. Mars did not seem the right place for that.

Mars had surprised her. When Franklyn Godalpin was offered the job of developing the Jason Mining Corporation's territory there, a few months after their marriage, it had been she who had persuaded him to accept it. She had had an instinct that the men who were in on the ground floor there would go places. Of Mars itself, as seen in pictures, her opinion was low. But she wanted her husband to go places, and to go with him. With Franklyn's heart and head pulling in opposite directions she could have succeeded on either side. She chose head for two reasons. One was lest some day he might come to hold the lost chance of his life against her, the other because, as she said:

"Honey. If we are going to have a family, I want them to have everything we can give them. I love you anyway you are, but for their sake I want you to be a big man."

She had persuaded him not only into taking the job, but into taking her with him. The idea was that she should see him settled into his hut as comfortably as the primitive conditions of the place allowed, and then go back home on the next ship. That should have been after a four-week stop—Earth reckoning. But the ship intended was the *Andromeda*; and she was the last in the present oppositional phase.

Franklyn's work left her little of his time, and had Mars been what she expected she would have been dismayed by the prospect of even an extra week there. But the first discovery she had made when she stepped on to the planet was that photographs can be literally true while spiritually quite false.

The deserts were there, all right. Mile upon mile of them. But from the first they lacked that harsh uncharitableness that the pictures had given them. There was a quality which in some way the lens had filtered out. The landscape came to life, and showed itself differently from the recorded shades.

There was unexpected beauty in the coloring of the sands, and the rocks, and the distant, rounded mountains, and strangeness in the dark deeps of the cloudless sky. Among the plants and bushes on the waterway margins there were flowers, more beautiful and more delicately complex than any she had seen on Earth. There was mystery, too, where the stones of ancient ruins lay half buried—all that was left, maybe, of huge palaces or temples. It was something like that, Marilyn felt, that Shelley's traveler had known in his antique land:

*Round the decay
Of that colossal wreck, boundless
and bare,
The lone and level sands stretch far
away.*

Yet it was not grim. She had looked to find a sour desolation; the morbid aftermath of eruption, destruction, and fire. It had never occurred to her that the old age of a world might come softly, with a gentle melancholy, like the turning of a leaf in the fall.

Back on Earth, people were looking on the Martian venturers as the new pioneers attacking the latest frontier opposed to man. Mars made nonsense of that. The land lay placidly open to them, unresisting. Its placidity dwindled their importance, making them crude intruders on the last quiet drowsiness.

Mars was comatose, sinking slowly deeper into her final sleep. But she was not yet dead. Seasonal tides still stirred in the waterways, and things still lived in the waters, too, though they seldom gave any more sign of themselves than a vagrant ripple. Among the flowers and the tinkerbells there were still insects to carry pollen. Kinds of grain still grew, sparse, poorly nourished vestiges of vanished harvests, yet capable of thriving again with irrigation. There were the thrip-pets, bright flashes of flying color, unclassifiable as insect or bird. By night other small creatures emerged. Some of them mewed, almost like kittens, and sometimes, when both moons were up, one caught glimpses of little marmosetlike shapes. Almost always there was that most characteristic of all Martian sounds, the ringing of the tinkerbells. Their hard shiny leaves which flashed like

polished metal needed no more than a breath of the thin air to set them chiming so that all the desert rang faintly to their tiny cymbals.

The clues to the manner of people who had lived there were too faint to read. Rumor spoke of small groups, apparently human, further south, but real exploration still waited on the development of craft suited to the thin Martian air.

A frontier of a kind there was, but without valor—for there was little left to fight but quiet old age. Beyond the busy settlement Mars was a restful place.

"I like it," said Marilyn. "In a way it's sad, but it isn't saddening. A song can be like that sometimes. It soothes you and makes you feel at peace."

Franklyn's concern over her news was greater than Marilyn's, and he blamed himself for the state of affairs. His anxiety irritated her slightly. And it was no good trying to place blame, she pointed out. All that one could do was to accept the situation and take every sensible care.

The settlement doctor backed that up. James Forbes was a young man, and no sawbones. He was there because a good man was needed in a place where unusual effects might be expected, and strange conditions called for careful study. And he had taken the job because he was interested. His line now was matter of fact, and encour-

aging. He refused to make it remarkable.

"There was nothing to worry about," he assured them. "Ever since the dawn of history there have been women producing babies in far more inconvenient times and places than this—and getting away with it. There's no reason at all why everything should not be perfectly normal."

He spoke his professional lies with an assurance which greatly increased their confidence, and he maintained it steadily by his manner. Only in his diary did he admit worrying speculations on the effects of lowered gravitation and air-pressure, the rapid temperature changes, the possibility of unknown infections, and the other hazardous factors.

Marilyn minded little that she lacked the luxuries that would have attended her at home. With her colored maid, Helen, to look after her and keep her company she busied herself with sewing and small matters. Martian scene retained its fascination for her. She felt at peace with it as though it were a wise old counsellor who had seen too much of birth and death to grow vehement over either.

Janessa, Marilyn's daughter, was born with no great trial upon a night when the desert lay cold in the moonlight, and so quiet that only an occasional faint chime from the tinkerbells disturbed it. She was the first Earth baby to be born on

Mars. A perfectly normal six and a half pounds—Earth—and a credit to all concerned.

It was afterwards that things started to go less well. Dr. Forbes' fears of strange infections had been well grounded, and despite his scrupulous precautions there were complications. Some were susceptible to the attacks of penicillin and the complex sulfas, but others resisted them. Marilyn, who had at first appeared to be doing well, weakened and then became seriously ill.

Nor did the child thrive as it should, and when the repaired *Andromeda* at last took off, it left them behind. Another ship was due in from Earth a few days later. Before it arrived, the doctor put the situation to Franklyn.

"I'm by no means happy about the child," he told him. "She's not putting on weight as she should. She grows, but not enough. It's pretty obvious that the conditions here are not suiting her. She might survive, but I can't say with what effect on her constitution. She should have normal Earth conditions as soon as possible."

Franklyn frowned:

"And her mother?" he asked.

"Mrs. Godalpin is in no condition to travel, I'm afraid. It's out of the question. In her present state, and after so long in low gravitation, I doubt whether she could stand half a G of acceleration."

Franklyn looked bleakly unwilling to comprehend.

"You mean—?"

"In a nutshell, it's this. It would be fatal for your wife to attempt the journey. And it would probably be fatal for your child to remain here."

There was only one way out of that. When the next ship, the *Aurora* came in it was decided to delay no longer. A passage was arranged for Helen and the baby, and in the last week of 1994 they went on board.

Franklyn and Marilyn watched the *Aurora* leave. Marilyn's bed had been pushed close to the window, and he sat on it, holding her hand. Together they watched her shoot upwards on a narrow cone of flame and curve away until she was no more than a twinkle in the dark Martian sky. Marilyn's fingers held his tightly. He put his arm around her to support her, and kissed her.

"It'll be all right, darling. In a few months you'll be with her again," he said.

Marilyn put her other hand against his cheek, but she said nothing.

Nearly seventeen years were to pass before anything more was heard of the *Aurora*, but Marilyn was not to know that. In less than two months she was resting forever in the Martian sands with the tinkerbells chiming softly above her.

When Franklyn left Mars, Dr. Forbes was the only member of the original team still left there. They shook hands beside the ramp which led up to the latest thing in nuclear-powered ships. The doctor said:

"For five years I've watched you work, and overwork, Franklyn. You'd no business to survive. But you have. Now go home and live. You've earned it."

Franklyn withdrew his gaze from the thriving Port Gillington which had grown, and was still growing out of the rough settlement of a few years ago.

"What about yourself? You've been here longer than I have."

"But I've had a couple of vacations. They were long enough for me to look around at home and decide that what really interests me is here." He might have added that the second had been long enough for him to find and marry a girl who he had brought with him, but he just added: "Besides I've just been working, not overworking."

Franklyn's gaze had wandered again, this time beyond the settlement, towards the fields which now fringed the waterway. Among them was a small plot marked with a single upright stone.

"You're still a young man. Life owes you something," the doctor said. Franklyn seemed not to have heard, but he knew that he had. He went on: "And you owe something to life. You hurt only yourself by resisting it. We have to adapt to life."

"I wonder—?" Franklyn began, but the doctor laid a hand on his arm.

"Not that way. You have worked hard to forget. Now you must make a new beginning."

"No wreckage of the *Aurora* has ever been reported, you know," Franklyn said.

The doctor sighed, quietly. The ships that disappeared without trace considerably outnumbered those that left any.

"A new beginning," he repeated, firmly.

The hailer began to call "All aboard."

Dr. Forbes watched his friend into the entrance port. He was a little surprised to feel a touch on his arm, and find his wife beside him.

"Poor man," she said, softly. "Maybe when he gets home—"

"Maybe," said the doctor, doubtfully. He went on: "I've been cruel, meaning to be kind. I should have tried my best to crush that false hope and free him from it. But . . . well, I couldn't do it."

"No," she agreed. "You'd nothing to give him to take the place of it. But somewhere at home there'll be someone who has—a woman. Let's hope he meets her soon."

Jannessa turned her head from a thoughtful study of her own hand, and regarded the slaty-blue arm and fingers beside her.

"I'm so different," she said, with a sigh. "So different from

everybody. Why am I different, Telta?"

"Everybody's different," Telta said. She looked up from her task of slicing a pale round fruit into a bowl. Their eyes met, Jannessa's china blue in their white setting looking questioningly in Telta's dark pupils which floated in clear topaz. A small crease appeared between the woman's delicate silvery brows as she studied the child. "I'm different. Toti's different. Melga's different. That's the way things are."

"But I'm more different. Much more different."

"I don't suppose you'd be so very different where you came from," Telta said, resuming her slicing.

"Was I different when I was a baby?"

"Yes, dear."

Jannessa reflected.

"Where do babies come from, Telta?"

Telta explained. Jannessa said, scornfully:

"I don't mean that. I mean babies like me. Different ones."

"I don't know. Only that it must have been somewhere far, far away."

"Somewhere outside; in the cold?"

"Farther than that." Telta considered a moment, then she added: "You've been up to one of the domes when it's all dark outside? You've seen the stars twinkling?"

"Yes, Telta."

"Well, it must have been one of

those twinkles that you came from. But nobody knows which one."

"Truly, Telta?"

"Quite Truly."

Jannessa sat still a moment, thinking of the infinite night sky with its myriads of stars.

"But why didn't I die in the cold?"

"You very nearly did, dear. Toti found you just in time."

"And was I all alone?"

"No, dear. Your mother was holding you. She had wrapped you round with everything she could to keep the cold away. But the cold was too much for her. When Toti found her she could only move a little. She pointed to you and said: 'Jannessa! Jannessa!' So we thought that must be your name."

Telta paused, remembering how when Toti, her husband, had brought the baby down from the surface to the life-giving warmth it had been touch and go. A few more minutes outside would have been fatal. The cold was a dreadful thing. She shuddered, recalling Toti's account of it, and how it had turned the unfortunate mother black, but she did not tell that to the child.

Jannessa was frowning, puzzled.

"But how? Did I *fall* off the star?"

"No, dear. A ship brought you."

But the word meant nothing to Jannessa.

It was difficult to explain to a child. Difficult, for that matter, for Telta herself to believe. Her ex-

perience included only the system she lived in. The surface was a grim, inhospitable place of jagged rocks and killing cold which she had seen only from the protected domes. The history books told her of other worlds where it was warm enough to live on the surface, and that her own people had come from such a world many generations ago. She believed that that was true, but it was nevertheless unreal. More than fifty ancestors stood between her and life on a planet's surface, and it is difficult for anything that far away to seem real. Nevertheless, she told Jannessa the story in the hope that it would give her some consolation.

"Which star did they come from? The same as mine?" the child wanted to know.

But Telta could not say.

"I don't think it can have been the same one. When the doctors were looking after you, they said that you must have come from a bigger world."

"Did they have to look after me a lot?"

"Quite a lot."

"Because of the cold?"

"That—and other things. But in the end they made it possible for you to live here. They had to work very hard and cleverly for you. More than once we thought we were going to lose you."

"But what were they doing?"

"I don't understand much of it. But you see you were intended for a different world. It must have been

one where there was more weight, thicker air, more humidity, higher temperature, different food, and—oh, lots of things you'll learn about when you're older. So they had to help you get used to things as they are here."

Jannessa considered that.

"It was very kind of them," she said, "but they weren't very good, were they?"

Telta looked at her in surprise.

"Dear, that's not very grateful. What do you mean?"

"If they could do all that, why couldn't they make me look like other people? Why did they leave me all white, like this? Why didn't they give me lovely hair like yours, instead of this yellow stuff?"

"Darling, your hair's lovely. It's like the finest golden threads."

"But it's not like anyone else's. It's different. I want to be like other people. But I'm a freak."

Telta looked at her, unhappily perplexed.

"Being of another kind isn't being a freak," she said.

"It is if you're the only one. And I don't want to be different. I hate it," said Jannessa.

A man made his way slowly up the marble steps of the Venturers' Club. He was middle-aged, but he walked with a clumsy lack of certainty more appropriate to an older man. For a moment the porter

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looked doubtful, then his expression cleared.

"Good evening, Dr. Forbes," he said.

Dr. Forbes smiled.

"Good evening, Rogers. You've got a good memory. It's twelve years."

They chatted for some minutes, then the doctor moved on leaving instructions that his guest should be shown to the smoke room. He had been sitting there some ten minutes when Franklyn Godalpin approached with outstretched hand. They chatted over a couple of drinks, and then went into the dining room.

"So now you're home for good—and loaded with medical honors," Franklyn said.

"It's a curious feeling," Forbes said. "Eighteen years altogether. I'd been there almost a year when you came."

"Well, you've earned the rest. Others got us there, but it's your work that's enabled us to build there and stay there."

"There was a lot to learn. There's a lot yet."

Forbes was not falsely modest. He was as aware as anyone of the results of his hard work. One of them was, indirectly the man who was facing him. Franklyn Godalpin was now all that counted in the Jason Mining Corporation, and a powerful man. But without the medical work which had gone into making humans fit for Mars and Mars fit for humans Jason itself would likely have folded up years

ago. It made Forbes feel in a way responsible for Franklyn.

"You never remarried?" he asked.

"No." Franklyn shook his head.

"You should have. I told you, remember? You should have a wife and family. It's still not too late."

Again Franklyn shook his head.

"I've not told you my news yet," he said. "I've had word of Jannessa."

Forbes stared at him. It he had ever thought anything more unlikely, he could not recall what it was.

"Had word," he repeated, carefully. "Just what does that mean?"

Franklyn explained.

"For years I have been advertising for news of the *Aurora*. The answers came mostly from nuts, or from those who thought I was crazy enough for them to cash in on—until six months or so ago.

"The man who came to see me then was the owner of a spaceman's hostel in Chicago. He'd had a man die there a little while before, and the man had something he wanted to get off his chest before he went out. The owner brought it to me for what it was worth.

"The dying man claimed that the *Aurora* was not lost in space, as everyone thought; he said that his name was Jenkins and he had been aboard her, so he ought to know. According to his story, there was a mutiny on the *Aurora* when she was a few days out from Mars. It was on account of the captain deciding to hand some of the crew over to the police on arrival, for crimes un-



specified. When the mutineers took over they had the support of all but one or two of the officers, and they changed course. I don't know what the ultimate plan was, but what they did then was to lift from the plane of the ecliptic, and hop the asteroid belt, on a course for Jupiter.

"The owner got the impression that they were not so much a ruth-

less gang as a bunch of desperate men with a grievance. They *could* have pushed the officers and the passengers out into space since they had all qualified for a hanging anyway. But they didn't. Instead, like other pirates before them, they elected to maroon the lot and leave them to make out as best as they could—if they could.

"According to Jenkins, the place chosen was Europa, somewhere in the region of its twentieth parallel, and the time somewhere in the third or fourth month of 1995. The party they stranded consisted of twelve persons—including a colored girl in charge of a white baby."

Franklyn paused.

"The owner bears a quite blameless character. The dying man had nothing to gain by a fabrication. And, on looking up the sailing list, I find that there was a spaceman named Evan David Jenkins aboard the *Aurora*."

He concluded with a kind of cautious triumph, and looked expectantly across the table at Forbes. But there was no enthusiasm in the doctor's face.

"Europa," he said, reflectively. He shook his head.

Franklyn's expression hardened.

"Is that all you have to say?" he demanded.

"No," Forbes told him, slowly. "For one thing I should say that it is more than unlikely—it is almost impossible that she can have survived."

"Almost is not quite. But I am going to find out. One of our prospecting ships is on her way to Europa now."

Forbes shook his head again.

"It would be wiser to call her off."

Franklyn stared at him.

"After all these years—when at last there is hope—"

The doctor looked steadily back at him.

"My two boys are going back to Mars next week," he said.

"I don't see what that has to do with it."

"But it has. Their muscles ache continually. The strain of that makes them too tired either to work or to enjoy life. The humidity here also exhausts them. They complain that the air feels like a thick soup all around and inside them. They have never been free of catarrh since they arrived. There are other things, too. So they are going back."

"And you stay here. That's tough."

"It's tougher for Annie. She adores those boys. But that's the way life is, Frank."

"Meaning?"

"That it's conditions that count. When we produce a new life, it is something plastic. Independent. We can't live its life as well as our own. We can't do more than to see that it has the best conditions to shape it the way we like best. If the conditions are in some way beyond our control, one of two things happens; either it becomes adapted to the conditions it finds—or it fails to adapt, which means that it dies.

"We talk airily about conquering this or that natural obstacle—but look at what we really do and you'll find that more often than not it is ourselves we are adapting.

"My boys have been acclimated

to Martian conditions. Earth doesn't suit them. Annie and I have sustained Martian conditions for a while, but, as adults, we were incapable of thorough adaptation. So either we must come home—or stay there to die early."

"You mean, you think that Janessa—"

"I don't know what may have happened—but I have thought about it. I don't think you have thought about it at all, Frank."

"I've thought of little else these last seventeen years."

"Surely 'dreamed' is the word, Frank?" Forbes looked across at him, his head a little on one side, his manner gentle. "Once upon a

time something, an ancestor of ours, came out of the water on to the land. It became adapted until it could not go back to its relatives in the sea. That is the process we agree to call progress. It is inherent in life. If you stop it, you stop life, too."

"Philosophically that may be sound enough, but I'm not interested in abstractions. I'm interested in my daughter."

"How much do you think your daughter may be interested in you? I know that sounds callous, but I can see that you have some idea of affinity in mind. You're mistaking civilized custom for natural law,

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Frank. Perhaps we all do, more or less."

"I don't know what you mean."

"To be plain—if Jannessa has survived, she will be more foreign than any Earth foreigner could possibly be."

"There were eleven others to teach her civilized ways and speech."

"If any of them survived. Suppose they did not, or she was somehow separated from them. There are authenticated instances of children reared by wolves, leopards, and even antelopes and not one of them turned out to be in the least like the Tarzan fiction. All were subhuman. Adaptation works both ways."

"Even if she has had to live among savages she can learn."

Dr. Forbes faced him seriously.

"I don't think you can have read much anthropology. First she would have to unlearn the whole basis of the culture she has known. Look at the different races here, and ask yourself if that is possible. There might be a veneer, yes. But more than that—" he shrugged.

"There is the call of the blood—"

"Is there? If you were to meet your great-grandfather would there be any tie—would you even know him?"

Franklyn said, stubbornly:

"Why are you talking like this, Jimmy? I'd not have listened to another man." Why are you trying to break down all that I've hoped for? You can't, you know. Not now. But why try?"

"Because I'm fond of you, Frank.

Because under all your success you're still the young man with a romantic dream. I told you to marry. You wouldn't—you preferred the dream to reality. You've lived with that dream so long now that it is part of your mental pattern. But your dream is of *finding* Jannessa—not of having found her. You have centered your life on that dream. If you *do* find her, in whatever condition you find her, the dream will be finished—the purpose you set yourself will have been accomplished. And there will be nothing else left for you."

Franklyn moved uneasily.

"I have plans and ambitions for her."

"For the daughter you know nothing of? No, for the dream daughter; the one that exists only in your mind. Whatever you may find, it will be a real person—not your dream puppet, Frank."

Dr. Forbes paused, watching the smoke curl up from his cigarette. It was in his mind to say: "Whatever she is like, you will come to hate her, just because she can not exactly match your dream of her," but he decided to leave that unspoken. It occurred to him also to enlarge on the unhappiness which might descend on a girl removed from all that was familiar to her, but he knew what Franklyn's answer to that would be—there was money enough to provide every luxury and consolation. He had already said enough—perhaps too much, and none of it had really

reached Franklyn. He decided to let it rest there, and hope. After all, there was little likelihood that Jannessa had either survived or would be found.

The tense look that had been on Franklyn's face gradually relaxed. He smiled.

"You've said your piece, old man. You think I may be in for a shock, and you want to prepare me, but I realize all that. I had it out with myself years ago. I can take it, if it's necessary."

Dr. Forbes' eyes dwelt on his face a moment. He sighed, softly and privately.

"Very well," he agreed, and started to talk of something else.

"You see," said Toti, "this is a very small planet—"

"A satellite," said Jannessa. "A satellite of Yan."

"But a planet of the sun, all the same. And there is the terrible cold."

"Then why did your people choose it?" Jannessa asked, reasonably.

"Well, when our own world began to die and we had to die with it or go somewhere else, our people thought about those they could reach. Some were too hot, some were too big—"

"Why too big?"

"Because of the gravity. On a big planet we could scarcely have crawled."

"Couldn't they have . . . well, made things lighter?"

Toti made a negative movement

of his head, and his silver hair glistened in the fluorescence from the walls.

"An increase in density can be simulated; we've done that here. But no one has succeeded in simulating a decrease—nor, we think now, ever will. So you see our people had to choose a small world. All the moons of Yan are bleak, but this was the best of them, and our people were desperate. When they got here they lived in the ships and began to burrow into the ground to get away from the cold. They gradually burnt their way in, making halls and rooms and galleries, and the food-growing tanks, and the culture fields, and all the rest of it. Then they sealed it, and warmed it, and moved in from the ships, and went on working inside. It was all a very long time ago."

Jannessa sat for a moment in thought.

"Telta said that perhaps I came from the third planet, Sonnal. Do you think so?"

"It may be. We know there was some kind of civilization there."

"If they came once, they might come again—and take me home."

Toti looked at her, troubled, and a little hurt.

"Home?" he said. "You feel like that?"

Jannessa caught his expression. She put her white hand quickly into his slaty-blue one.

"I'm sorry, Toti. I didn't mean that. I love you, and Telta, and Melga. You know that. It's just

... oh, how can you know what it's like to be different—different from everyone around you? I'm so *tired* of being a freak, Toti, dear. Inside me I'm just like any other girl. Can't you understand what it would mean to me to be looked on by everyone as normal?"

Toti was silent for a while. When he spoke, his tone was troubled:

"Jannessa, have you ever thought that after spending all your life here this really is your world. Another might seem very . . . well, strange to you?"

"You mean living on the outside instead of inside. Yes, that would seem funny."

"Not just that, my dear," he said, carefully. "You know that after I found you up there and brought you in the doctors had to work hard to save your life?"

"Telta told me." Jannessa nodded. "What did they do?"

"Do you know what glands are?"

"I think so. They sort of control things."

"They do. Well, yours were set to control things suitably for your world. So the doctors had to be very clever. They had to give you very accurate injections—it was a kind of balancing process, you see, so that the glands would work in the proper proportions to suit you for life here. Do you understand?"

"To make me comfortable at a lower temperature, help me to digest this kind of food, stop over stimu-

lation by the high oxygen content, things like that Telta said."

"Things like that," Toti agreed. "It's called adaptation. They did the best they could to make you suited to life here amongst us."

"It was very clever of them," Jannessa said, speaking much as she had spoken years ago to Telta. "But why didn't they do more? Why did they leave me white like this? Why didn't they make my hair a lovely silver like yours and Telta's? I wouldn't have been a freak then—I should have felt that I really belonged here." Tears stood in her eyes.

Toti put his arm around her.

"My poor dear. I didn't know it was as bad as that. And I love you—so does Telta—as if you were our own daughter."

"I don't see how you can—with this!" She held up her pale hand.

"But we do, Jannessa, dear. Does that really matter so very much?"

"It's what makes me different. It reminds me all the time that I belong to another world, really. Perhaps I shall go there one day."

Toti frowned.

"That's just a dream, Jannessa. You don't know any world but this. It couldn't be what you expect. Stop dreaming, stop worrying yourself, my dear. Make up your mind to be happy here with us."

"You don't understand, Toti," she said, gently. "Somewhere there are people like me—my own kind."

It was only a few months later

that the observers in one of the domes reported the landing of a ship from space.

"Listen, you old cynic," said Franklyn's voice, almost before his image was sharp on the screen. "They've found her—and she's on the way Home."

"Found—Jannessa?" Dr. Forbes said, hesitantly.

"Of course. Who else would I be meaning?"

"Are you—quite sure, Frank?"

"You old sceptic. Would I have rung you if I weren't? She's on Mars right now. They put in there for fuel, and to delay for proximity."

"But can you be sure?"

"There's her name—and some papers found with her."

"Well, I suppose—"

"Not enough, eh?" Franklyn's image grinned. "All right, then. Take a look at this."

He reached for a photograph on his desk and held it close to the transmitting screen.

"Told them to take it there, and transmit here by radio," he explained. "Now what about it?"

Dr. Forbes studied the picture on the screen carefully. It showed a girl posed with a rough wall for a background. Her only visible garment was a piece of shining cloth, draped round her, rather in the manner of a sari. The hair was fair and dressed in an unfamiliar style. But it was the face looking from

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beneath it that made him catch his breath. It was Marilyn Godalpin's face, gazing back at him across eighteen years.

"Yes, Frank," he said, slowly. "Yes, that's Jannessa. I . . . I don't know what to say, Frank."

"Not even congratulations?"

"Yes, oh yes—of course. It's . . . well, it's just a miracle. I'm not used to miracles."

The day that the newspaper told him that the *Chloe*, a research ship belonging to the Jason Mining Corporation, was due to make ground at noon, was spent absent-mindedly by Dr. Forbes. He was sure that there would be a message from Franklyn Godalpin, and he found himself unable to settle to anything until he should receive it. When, at about four o'clock the bell rang, he answered it with a swift excitement. But the screen did not clear to the expected features of Franklyn. Instead, a woman's face looked at him anxiously. He recognized her as Godalpin's housekeeper.

"It's Mr. Godalpin, doctor, she said. "He's been taken ill. If you could come—?"

A taxi set him down on Godalpin's strip fifteen minutes later. The housekeeper met him and hurried

him to the stairs through the rabble of journalists, photographers and commentators that filled the hall. Franklyn was lying on his bed with his clothes loosened. A secretary and a frightened-looking girl stood by. Dr. Forbes made an examination and gave an injection.

"Shock, following anxiety," he said. "Not surprising. He's been under a great strain lately. Get him to bed. Hot bottles, and see that he's kept warm."

The housekeeper spoke as he turned away.

"Doctor, while you're here. There's the . . . I mean, if you wouldn't mind having a look at . . . at Miss Jannessa, too."

"Yes, of course. Where is she?"

The housekeeper led the way to another room, and pointed.

"She's in there, doctor."

Dr. Forbes pushed open the door and went in. A sound of bitter sobbing ended in choking as he entered. Looking for the source of it he saw a child standing beside the bed.

"Where—?" he began. Then the child turned towards him. It was not a child's face. It was Marilyn's face, with Marilyn's hair, and Marilyn's eyes looking at him. But a Marilyn who was twenty-five inches tall—Jannessa.

THE END

THE ANALYTICAL LABORATORY

This month we have a newly improved and greatly enlarged version of the Lab—with an interesting variation. Instead of merely analyzing

the opinions of the readers, lo! we analyze the readers! But first, the usual monthly report on the reader opinions of the April issue.

Place	Story	Author	Points
1.	The Undecided	Eric Frank Russell	1.96
2.	Plague	René Lafayetee	3.23
3.	Colonial	Christopher Youd	3.40
4.	Devious Weapon	M. C. Pease	3.57
5.	Seetee Shock (End)	Will Stewart	3.90

I felt, myself, that Russell was really having fun with the various characters of "The Undecided"; evidently you did too.

And now for the main event, Mr. Reader, meet yourself! You're just under thirty, have a college degree, and have been reading the magazine about eight years. And you're pretty definitely *Mr. Reader*—93.3% certain, anyway. The chances are four to one you're under thirty-five. But your occupation is anybody's guess, including almost everything. The figures, however:

Type of Occupation:

Engineering	14.7%
Mechanical-Electrical	7.6
Sales & Advertising	7.5
Research	7.3
Chemistry	5.2
Professional (Law, Medicine, etc.)	5.2
Executive Management	5.0
Technician (Radio, Radar, Electronic, Metallurgy, etc.)	4.5
Clerical & Secretarial	4.5
Auditing-Accounting	4.0
Armed Forces	3.5
Writers-Editorial	3.3

Supervisory	2.2%
Architecture, Design	1.7
Civil Service	1.5
Agricultural	1.2
"Others"	8.6

That "Others" includes:

Pilots	Building contractors
Librarians	Import-Export
Actors	Merchants
Telegraphers	Costume designers
Insurance	Retailing
Artists	Photographers
Communications	Personnel
Not Stated	3.8%

The types of jobs held in the technical fields range from Abstract Writer to Zoologist. There are biochemists, and biophysicists, nuclear chemists and nuclear physicists, college students and retired consulting engineers. There are microbiologists and rocket instrumentation specialists, rubber-plastic technologists and endocrinologists.

Incidentally, you're doing all right by yourself, too. The average salary is just over four hundred dollars a month, with some three percent

struggling along on one thousand dollars or more per month. And, of course, quite a few reporting "College Student—no income."

On the editorial features, division of the questionnaire, the novelette ranked first with a score of 5,129 on a weighted-vote basis, short stories second with 3,906 and serials third with 3,847. Evidently the shorts and serials actually rate just about tied. I realize a lot of people do resent the two to three months wait between beginning and end of a serial—but what can we do? On the question of "What other features or changes would you suggest?", the answers had a wide range. "Revive *Unknown Worlds*" incidentally got a 2.3% vote—which, considering it isn't properly a feature of this magazine, was a considerable write-in vote. However the biggest single suggestion—18.4%—was simply on the order of the old machinists' proverb: "Don't monkey with a smooth-running machine." In addition to those who specifically stated "No changes!" 41.7% had no change-suggestions to offer.

Next to "No changes" with a 7.3% vote was the "More articles and bigger issues" item. Then "More scientific and technical articles" from 5.0%. Somewhat after the manner of Congress making up a new budget, everybody had things to add, but nobody had any suggestions as to where the extra space was to come from. Adding the percentages of "Add more whatzit," the total wanting more of everything

comes out 25.8%. Naturally I'd like more space, too. Well, you can get butter for under a dollar a pound again now, so maybe we can get more paper again soon.

But there are demands for more book reviews, more listings of science-fiction books, and more ads relating to the field of science-fiction and science. Quite so; the book publishers and bookstores advertising in the magazine now list all the new books; we will run more reviews. That seems the most workable compromise. That the requests for more book listings are genuine seems indicated, incidentally, by the results the book-advertisers in the magazine have been getting. (Note that Julius Unger has expanded from one half page to full-page ads.)

And I also want to explain something of the mechanics of the job of analyzing them. As of this time of writing, nearly three thousand of them have been received. It's wonderful. I appreciate it. I also appreciate that the notes accompanying roughly one third of them deserve answering. But please—accept this as an answer! It's impossible to answer that much mail; over two thousand of the questionnaires had been received and tabulated by the research staff of Street & Smith at the end of three weeks.

The figures you now have; the further results of those figures you will see in the coming year. My very genuine thanks for your help.

THE EDITOR



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