

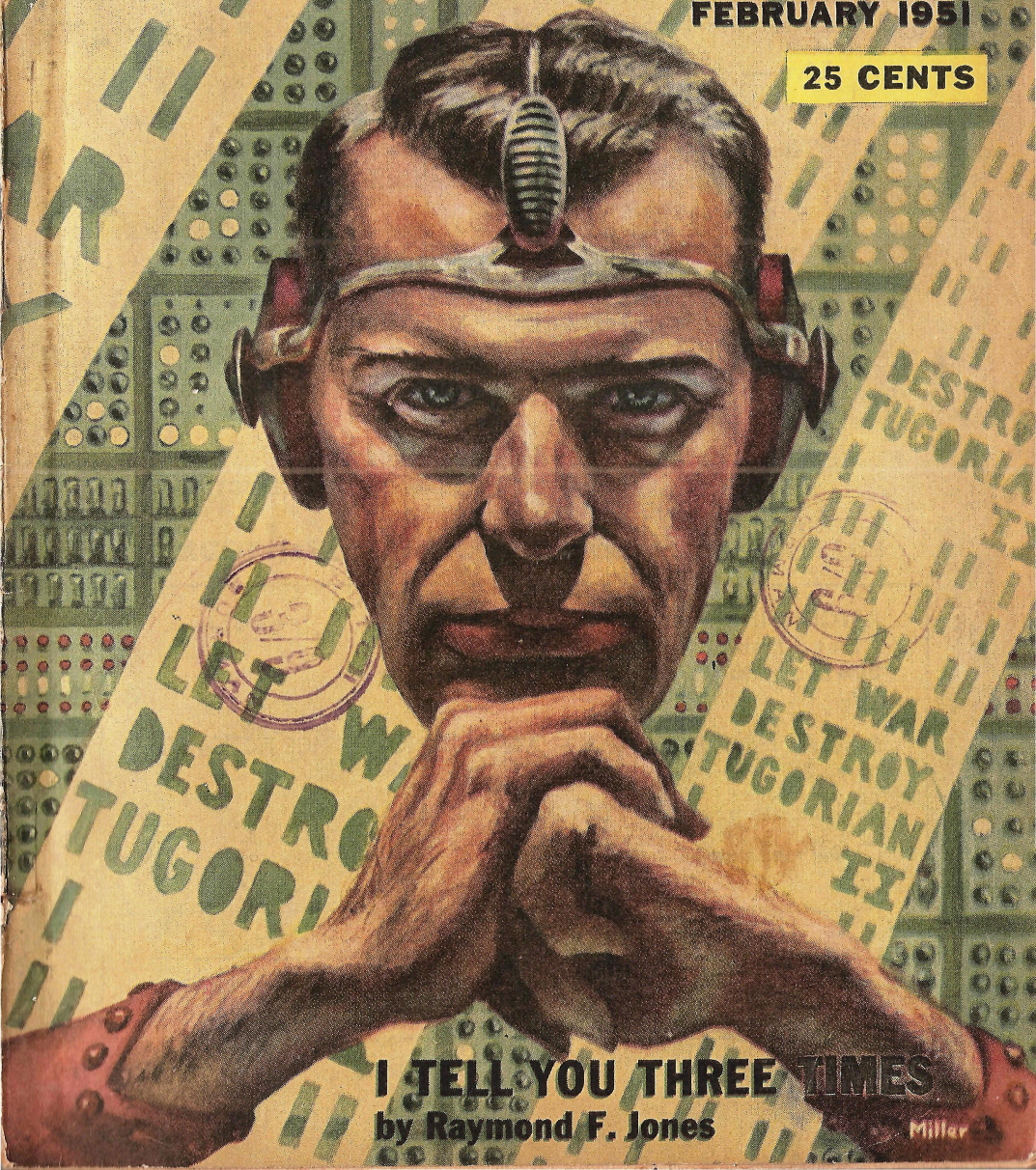
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FEBRUARY 1951

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I TELL YOU THREE TIMES
by Raymond F. Jones

Miller

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
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NEXT ISSUE ON SALE FEBRUARY 21, 1951

NONSECRET

The United States, which was first in developing a nuclear reactor which worked, is, appropriately, the first to set up a nonsecret nuclear reactor. And North Carolina State College is to be the first university possessing a nonsecret uranium reactor.

The step is an important one, naturally; frankly, it seems to be a bit overdue, but certainly it was inevitable that the United States would be the first to establish such a laboratory.

The reactor will be of the "Los Alamos Water-Boiler" type. The essentials of this type of reactor are very simple; a container, some U-235-enriched uranium salt, and water. The device is inherently incapable of explosive action, is inherently self-regulating, and uses an extremely moderate amount of material.

Briefly, a mixture of natural uranium, with added U-235 or Pu-239, is converted to a water-soluble salt. The salt used is not specified, but is quite possibly uranyl sulphate; whatever it is, it must be a compound containing only atoms which

are not neutron-absorbers. Oxygen and sulphur both qualify in that respect. The dry salt will not undergo fission reaction; the proportion of U-235 to U-238 is such that the U-238 absorbs too many neutrons to permit a self-sustaining chain reaction. However, when this salt is dissolved in water, and the uranium atoms sufficiently dispersed, the intervening water molecules act to slow down the released neutrons. The slow-moving neutrons will not be absorbed by U-238, but will simply wander about until they either escape, are absorbed by nonreactive impurities present, or meet a U-235 atom with which they will react.

When sufficient water is present, the neutron-slowng action permits chain-reaction to commence. The chain reaction produces heat which tends to evaporate the water, and drive it off as steam. But when the water is driven off, the remaining uranium salt becomes too concentrated, and chain reaction is interrupted. There is a critical minimum of water; below that, chain reaction cannot proceed. There is, obviously,

a critical maximum, above which the dilution of uranium is too great to permit reaction. Between these two points, there is a relatively broad range. Approaching from the too-little water side, the rate of reaction, of energy release, rises at a fantastically rapid rate with increasing water. And this provides the self-regulating characteristic. Add water, the reaction starts and continues until the water has been boiled off to the nonreaction point. This factor provides a perfectly self-regulating stable condition. A steam-boiler sort of explosion would be the worst that could be achieved even by the most deliberate efforts to induce trouble.

The total amount of U-235 required amounts to only about two and one half pounds. It takes roughly twenty pounds of purified U-235, in very special arrangement to produce a nuclear explosion; the small amount present simply cannot possibly be induced to explode as a nuclear bomb. Furthermore, the small amount cannot be stolen for use as a nuclear weapon; it is completely safe.

The U-235 present in the reactor will give away no process secrets, naturally; a finished product gives no information on how it got that way.

But a free nuclear reactor, open to non-Atomic Energy Commission scientists, promises immensely important research finds. The employees of the AEC are specifically required by law, to devote their government-paid time to government-

required problems. Fundamental nuclear research along certain lines, weapons research, isotope production, et cetera, have come within those lines. But the nongovernmental scientist can devote his time to anything he deems interesting and worth while. And now the nonrestricted researcher will have a research tool of maximum capability for his work.

The North Carolina reactor can be used to supply high-intensity neutron radiation, high intensity gamma rays, to provide information about extremely short-lived isotopes, for a thousand research purposes not hitherto achievable outside of AEC laboratories by reason of the legal requirements of any government-controlled operation.

The North Carolina State College reactor is the first; certainly others should be established as soon as possible. This provides a free research facility in the southeastern United States—but several more are needed for the adequate education and training of nuclear physics students, nuclear chemists, and the like, in this country. The specialists in education are the ones to decide how many, and where, not the nuclear physicists. The power plant design engineer does not determine the industrial-economic factors that decide where the equipment he designs should be used.

And, I most sincerely hope, it will not be determined on the basis of who votes which way in what legislative body!

THE EDITOR.

I TELL YOU THREE TIMES

BY RAYMOND F. JONES

Life without annihilating war depended on keeping peace in the galaxies. And that depended on the computing machine, for the problem was too big for living brains. And the computer was insane . . .

Illustrated by Miller

Hardon Ingeman and his wife sat on the front steps of their home watching the game of "Keep Away" being played on the lawn. On one side were the ten-year-old twins, Irene and Joyce. On the other was George, the eight-year-old. And there was Dom Figora.

Dom Figora was a Tugorian. Like Hardon Ingeman, he was a Computerman serving the great Administrative Computer of the Galactic Council. He was fond of the twins and George, and played with the Ingeman children whenever he got the chance.

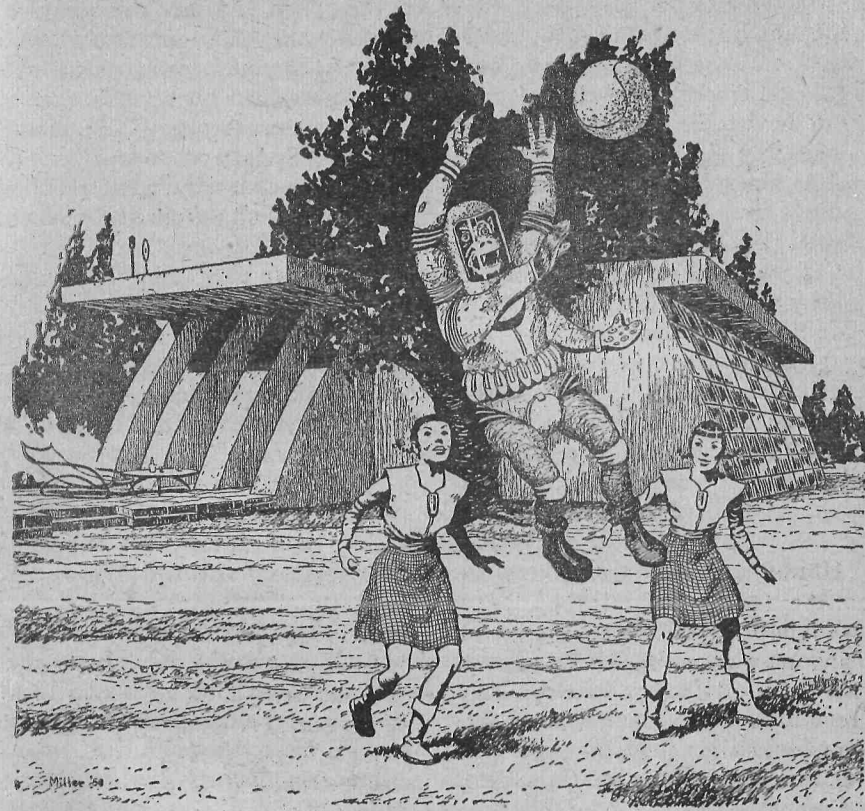
He had to wear a suit when he came to visit, because he breathed a vicious concoction of nitrogen, oxygen and hydrogen compounds that was sheer poison to Earthmen—as their atmosphere was to him. In spite of the suit he managed to get around pretty well.

He was short, about the height of the two girls. He had six appendages, two arms and two legs, and two intermediaries which seemed serviceable as either arms or legs. There were large, round, trusting eyes showing through the plates of his helmet. They were surrounded by smooth patches of fur. On the whole, his would have been a cute, innocent visage by Earth standards except for the tusks.

These were of tiger size and reminders of the not too distant days before Tugorian IX was admitted to the Council—reminders of the days when tusks like those had torn human flesh.

Leatrice Ingeman watched the Tugorian leap for a high ball, his squat body soaring under gravity that was far less than normal for him.

She shuddered faintly as she watched the alien face. "I'll be glad



when you can't bring him around any more. Those teeth—I can't help thinking he's about to eat one of the children. It's dangerous. You don't know that he'll never regress."

Ingeman knocked the stem of his pipe against his teeth and patted his wife's plump arm. "Sometimes I think your sense of Life Unity doesn't perk any better than Dom's used to."

"It doesn't perk at all where he's concerned!"

Ingeman smiled, watching the

game. "I'm going to miss Dom. He's close to being the best friend I've got, and his mind is pure lightning. And he enjoys playing ball with the kids as much as his great great grandpa would have enjoyed eating them. Dom may have come from a long line of savages, but then, didn't we all?"

"Mine are a lot farther up my family tree."

He grinned maliciously. "That could be argued, honey. That could be argued."

"It had better not be!"

It could, he thought in silent insistence. Men were a pretty young race as galactic inhabitants went.

But he let the thought drift. He watched the sun sinking low in the west as he had done so many other evenings from this same spot. It was so good that he could almost believe that it was real—a real sun and a real sky and a real Earth. Almost.

He nodded to his neighbor mowing grass on the other side of the hedge. Here in this alien place the sun shone and the rain fell and grass and children grew, and it was hard to believe that it was not of Earth, on Earth. It was hard to believe that the sky was no more than a dome that kept out the cold and emptiness of space a scant two thousand feet above their heads.

Sudden squeals of triumph came from the girls as they tackled Dom simultaneously and bore him to the ground amid a flurry of legs. The Tugorian banged the sod in a gesture of willing defeat.

George gave a snort of disgust that displayed dental vacancies. "You did that on purpose, Uncle Dom! You just think it's not polite winning over women."

"But they got me down!" protested the Tugorian.

"Aw, nuts. With one flip of your flipper you could knock them both across the street."

"But that wouldn't be fair." "Pulling punches isn't fair, either."

The Tugorian rose and brushed

off the rough fabric of the suit. He crossed and put an arm about George's shoulder, which was not much lower than his own.

"Come on, George—you don't think I really let you down?"

"Naw, of course not, but I'd like to win *something* from the women around here just *once*."

Dom Figora chuckled as he turned toward Ingeman. "George just doesn't like females!"

The boy's father laughed. "That comes much later among our species. Another ten years, and back on Earth—you'll see."

Dom Figora sat beside them, settling down to an awkward squat in the suit. His eyes turned also to the setting sun. The whir of the lawn mower next door was a hypnotic sound in the evening air. A pleasant humid mist rose from the yard across the street where the grass was being sprinkled after the day's heat.

"Back on Earth," sighed Dom Figora. "I wish you didn't have to go, but I suppose you are looking forward to it—getting back to your own people and your own world. How far is it . . . six hundred and eighty million light-years to Earth?"

Ingeman nodded. "About that."

"We've got to get back where we can rear the children in their natural environment," said Leatrice patiently. "This has been good make-believe the past five years, but after all, it's nothing *but* make-believe."

Dom was silent, watching her. "Some day I hope to visit Earth,"

he said. "I would like to have you know me better. Perhaps some of my wives could come— There must be some way that I could make you like me, Leatrice Ingeman."

There was a startling quietness as his heavily charged words trailed out. Leatrice raised her head as if he had struck at her, then her eyes softened.

"I have never said that I didn't like you, Dom."

"Let us try to understand each other," said Dom Figora. "There are so few days left to us, and it may be that I shall see none of you again. You must understand what it means to a Tugorian to be able to exist in terms of a full sense of Life Unity linking him to other species. My people have been the enemy of all other sentient life for so many long generations. We never dreamed of the existence of such a thing as Life Unity until it was brought to us. It is like a vision of a new world to say that Hardon Ingeman is my friend."

Leatrice watched his face soberly. In the complex, precise Synthetic language which they spoke, she could grasp the intent of his mind. She felt a faint stirring of understanding towards the repulsive alien. But it could never be a vital, intensive comprehension of his needs.

"Life Unity is not inherent in all of us, either," she said sadly. "And there were long ages on Earth when it seemed almost nonexistent on an inter-species level. It was so heavily blocked that we very nearly de-

stroyed our own kind. Yet we discovered that all men are potentially strong in it.

"But inter-species Fourth Level— That is something else again."

"Perhaps there will one day come a science that will discover it in all sentient life," said Dom. "Until then, however, it is a tenuous dream that some of us can share. Tugorians are grateful for the experimental induction of it."

Leatrice Ingeman watched the sad eyes of the Tugorian. His yearning to be understood almost reached her and bridged the gap between them. She could almost stop thinking of him as an—animal.

"I won't ever forget you," she said sincerely.

At that moment a siren whistle moaned suddenly over the darkening city. Hardon Ingeman withdrew the pipe from his mouth and listened. Dom Figora held himself very still, and over all the community there fell a silence except for the moan of the siren.

It was a simple three notes repeated over and over again. Ingeman felt a strange stillness and tightness within him as he recognized it— recognized it even though he had never heard it until now.

"What is that?" exclaimed George. "What does that one mean?"

"Priority dilemma," murmured Ingeman. "Trouble on the computer. Let's go, Dom."

He saw the worry in Leatrice's eyes as he kissed her. "Is it some-

thing serious?" she murmured.

"Very serious or they wouldn't be calling us in with that signal. Don't wait up for me. Might be gone all night."

His neighbors who were Computermen were moving out to their cars as he followed Dom Figora to the curb. He waved to the man who had abandoned the lawn mower next door. It was Colt Bradshaw, a rookie Computerman, only two months out of Earth.

"Want to ride, Colt?"

"Sure. What the devil is up, anyway? I thought that fire signal was just on the books—never to be used."

"It's on the books, all right, and it's plenty serious when it is used. It can only mean a major breakdown in the computer. I don't think that's happened twice in the last five hundred years."

He swung the car around for the short drive to the receptor center of the Earth colony. The twins and George waved from the porch, and then he lost them in the growing darkness.

The bulk of the receptor building loomed against the sky dome in the center of the community. Perhaps this emergency call would be his last tour of duty before leaving it forever to return to Earth, Ingeman thought. A Computerman's assignment couldn't last forever—few of them would want it to, but there was inevitable nostalgia as the moment of leaving approached. He envied

Colt Bradshaw who was just beginning.

He thought of how it had been when he first came here five years ago. And he thought of how it had been when he was a child and first dreamed of being a Computerman.

He had looked then into the night sky with yearning fear searching the unknown depths of heaven where dwelt the Big Brain. That was when he was very young. He soon learned to know what the great computers were and understand the anchorage they provided for a universe that might well have exploded to swirling vapor without their aid.

Then, in school, he'd learned the history of the galaxies and the part the computers had in establishing a community of worlds.

He learned the endless names of half forgotten empires that spanned galaxies only to fall in ruins when the impetus of their own greed and brutality thundered to a standstill.

He was taught very carefully the fundamental principles that had gained successful footholds towards establishing a community of galaxies.

It was done only by those species which had developed successfully an understanding of Life Unity.

On Earth, it was the observation of a half million years that men were at once capable of the most insane brutality or the tenderest mercy towards one another. Philosophers, poets, and scientists wrestled through the generations with it and died with the paradox unsolved. Then, at last,

the simple uncovering of the sense of Human Unity showed the answer. It showed that inherently men are kind and tender towards one another. It showed a coalescent force born within them drawing all mankind together in a common purpose of reaching for the stars as one man.

This unity flowing through all human life was finally evaluated, measured and means of control established. Men were found brutal only when their mutual sense of unity was boxed in by brutality which they, in turn, had suffered. The developing science of mind freed this life quantity and made men great.

And when at last they did reach the stars they found other creatures who had made the same discovery. They found that not only Human Unity, but Life Unity existed and flowed between not only those of a species but between differing species of sentient minds. And both were needed to hold the stars after they were reached.

It was almost—but not quite—a universal quantity. There were creatures possessing a sense of Unity that encompassed their own species, but which was utterly hostile towards alien life of any kind.

Such, for one, was Tugorian life when men first found it. The creatures were in a sense cannibalistic, preying without reserve on other forms of sentient life as high or higher than their own. But, in a triumph of the science, the broader sense of Life Unity had been artifi-

cially induced in the Tugorians until they were judged capable of sitting in the Council of the worlds.

Only among those creatures strong in inter-species Unity was any kind of intergalactic government possible.

For there were strange species that seemed to Earthmen like something dredged from the bottom of the seas, ghastly apparitions whose visage was the stuff of nightmare—these were the companions with whom men sat in the sanctuary of the Galactic Council. These were the fellow Computermen with whom they worked to establish a community of law within the Universe.

Their only common denominator was that sense of belonging, of being living sentiences together against the vast black of space and time.

But there was no council chamber built that could hold the representatives of the galaxies that they might ponder and debate their common problems. A single solar system would scarcely accommodate their numbers. Corporeal conference was patently impossible. A tool for administration and representation was needed.

They built such a tool when their techniques permitted, and they built solidly and well for millennia to come. They occupied an entire solar system darkened and burned by forgotten wars, and there they built machines—machines that covered a planet such as this one upon which Hardon Ingeman and Dom Figora worked as Computermen—along with

almost one billion others.

The tool was an engine, a logic and computing engine, a storehouse of the facts and the histories of the galaxies, of the names and shapes of their planets and their peoples, the things they ate and the way they died, and the things for which they worked.

It was a *library*—cross-indexed and fitted with computational equipment designed on the axiom: What I tell you three times is true. An errorless computer.

One man's lifetime was not enough to acquaint him with the planets of a single galaxy, but the logic engines knew, and a man could find out for the asking the substance and content of any planet in the Universe.

Because inter-species Unity was not a universal quantity there were the governed and the governors—by sheer necessity. And most of the governed did not know that the governors existed. The Council made no attempt to crush any species into a predetermined pattern. Its only interest was in building Unity where it was blocked, in order that sentient things of the Universe would cease to burn down the worlds and each other. This was the goal, and it was task enough for the lifetimes of billions.

No single individual attempted to comprehend the whole vast workings of which he was a tiny part. He knew that his fellows operated with a full sense of Life Unity, and he knew that the logic engine was an errorless ma-

chine. That was all that he needed to know.

It *had* to be that way, because no living mind could encompass the Universe. There *had* to be faith in one's fellows and the Computer—or Chaos.

Except now.

Except for the twice in a millennium breakdown—

The computer had broken down so completely that the Council was without any of its services. That was the meaning of the signal that was summoning Computermen from all parts of the city. And over the whole planet Computermen were rushing inside *their* domes to attend the monster they served.

Ingeman turned the street corners automatically, keeping his eye on the great block of the receptor building. They were almost there, but he could not yet visualize the significance of the breakdown.

There were two possibilities: That it was a transient thing that could be repaired in a few hours, or that it was a catastrophic disorder that would leave the Council ineffective for a long time.

If the latter case, the sense of mutual trust that made Life Unity would be tested as it had never been tested before. Races had been brought into contact that could never endure on the basis of mutual trust alone—because they didn't possess it. They were being led like little children on the hope that a shadow of Life Unity would develop—but this

guidance demanded the computers. The Tugorians were the vanguard of this experiment.

Ingeman brought the car to a halt in the parking area and climbed out. Bradshaw and the Tugorian followed him into the brightly lit halls where Bradshaw turned off.

"Down to the rookie's bunk for me. Thanks for the lift."

"You can ride back if we get off together."

Both Ingeman and Dom Figora, in his own colony, were members of the Chief Computermen's Board, the technical body in charge of maintenance and improvement of the mechanism. Their station was on the top floor of the building.

In silence they rode the elevator. It opened and let them directly into the main control booth of the Board. A half dozen Earthmen were physically present in the room, and on the individual television screens the faces of several hundred aliens showed in nightmare array.

The face of Dom Figora would have been one of these had he been in his home colony instead of visiting Ingeman. These were the Computermen directing the activities of all their fellows.

Miles Grandon, Director of the Terrestrial sector of the Board, nodded as the two came in. He was a tall, graying man serving his fifth five-year stretch as Computerman. Like Ingeman, he was well towards the end of his service, because he could not now renew under any cir-

cumstances once this term was ended.

Ingeman was struck by the deep marks of fatigue that seemed to have appeared overnight on Grandon's face. He merely returned his chief's nod, however, and went at once to his Computerman's position at the bank, knowing the problem would be available at a far more rapid rate than any speech could convey it.

But Grandon stopped him. "Let it go, Hardon. I can tell you what it is. I'd *rather* tell you—especially with Dom Figora here."

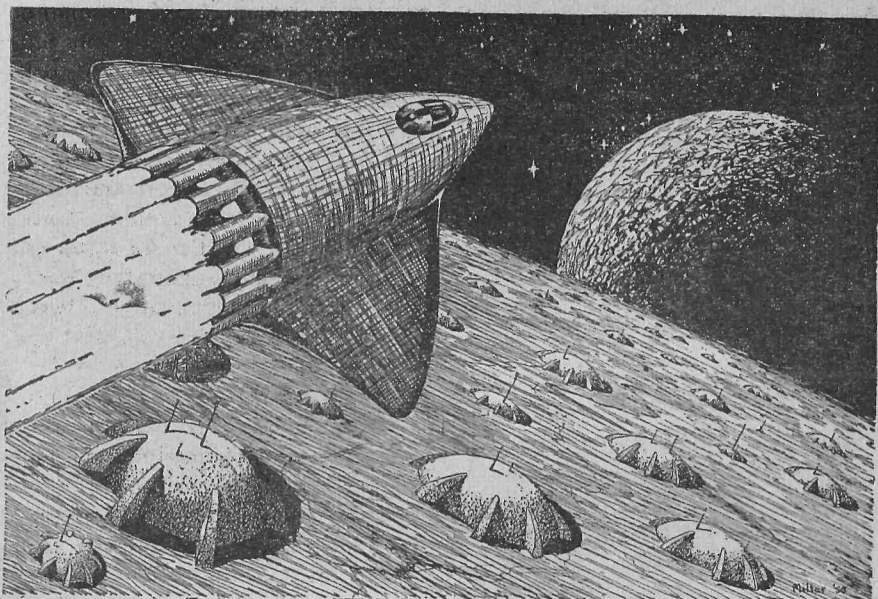
Grandon leaned back against the computer table as Ingeman and Dom Figora gave their attention. "The machine is wholly out of computation," he said abruptly.

For an instant Ingeman felt as if there were a ringing in his ears and he had the spinning sensation of whirling down a dark tunnel of time to the nights when he looked to the sky with fear and awe and wondered what men would do if the Big Brain were not there.

"How? How did it happen?"

"You are aware of the problem involved, Dom," said Grandon, "but you probably haven't met it yourself, Hardon. It's this: We have a dispute to settle between Dom Figora's world of Tugorian IX and a non-Council planet called Clopand who disputes possession of a certain uninhabited planetary system. Sporadic warring has broken out between the colonists."

"This is a routine problem that should be easily settled as you well know. But we get an incredible answer to it. The computer says: Let



Clopond's war destroy Tugorian IX!"

"War! That's insanity," Ingeman cried. "The machine's gone crazy."

"Excellent thinking," said Grandon dryly.

"I'm sorry. I didn't mean to imply the situation was trivial. It's difficult to evaluate a thing of this kind."

"I'm sorry," said Grandon kindly. "We are all getting so that we think badly."

Dom Figora moved slowly and with a futile, fumbling gesture as if coming out of a shock. "My world—the computer demands its destruction! I don't understand—but how can we know that it is in error? Perhaps with the information it has—

The machine is always right. What I tell you three times—"

"Dom!" Ingeman stepped closer to the Tugorian. He wished that the barrier of the suit didn't have to be forever between them. He could never look into the Tugorian's face as one man to another.

But, peering closely now, he detected the physical evidence of the blow that Dom Figora received with these news.

Ingeman's voice was intense. "The computer is crazy. It's nothing but a machine. Just because it can add a couple of billion digits in nothing flat and come up with a smart looking answer is no sign that it's going to tell us to knock your home world into atoms. You know that, don't

you, Dom? The machine's crazy and we're going to find out why."

When he stopped Ingeman felt that he had been stupidly patronizing. The Tugorian didn't have to be spoken to like a child who's lost his marbles. Or did he? The stunned, uncomprehending look remained on the furry, tusked face, and Dom Figora seemed to be rocking on his heels.

"You have no evidence of error in the machine—" he said faintly.

"It's out of line with the laws of Life Unity," snapped Ingeman. "That's evidence enough. There is *no* legitimate cause for war. There is *no* cause for the Clopondians to make war on your world, and anything that says so is crazy. Can't you understand that?"

"You have no evidence?" Dom Figora persisted, addressing Grandon.

"Hardon is correct. The answer is its own evidence."

The little Tugorian technician looked down at the floor a moment as if in private thought that was deep and bitter. Then he said at last, "My colony. I must go to them and confer with the rest of my people. You will excuse me, please?"

Ingeman gripped his arm hard. "Dom, we've got to find the trouble. Why don't you stay here with me and we'll work on it together? Remember that foul-up they gave us at computer school for final exam and you and I were the only ones that

tracked it down? It's just like that, Dom. How about it?"

Grandon broke in before the Tugorian could answer. "I'm afraid it isn't just like that, Hardon. I was glad to see Dom because I want him to go back to his colony and make contact with them, find out what goes on there. You see, the computer cut them off completely, shut down every communication channel between them and the outside. They're isolated."

Dom looked up with a start in his fear-filled eyes. "The machine must hate us!" he exclaimed softly. "The computer *wants* us destroyed."

"Dom! For heaven's sakes—" Ingeman backed momentarily from what he saw in the Tugorian's eyes. "Dom, you've got to go down to the dispensary. Don't you understand what it's doing to you?"

The Tugorian smiled softly. "It's all right now. It knocked me pretty unsteady for a minute, but I won't need attention. With your permission I will contact my group as suggested. We can all work together on the problem."

"Please report to the Board as soon as you can," said Grandon. "We'll go on from there."

Ingeman watched the small, alien creatures move towards the elevator well and disappear behind the doors. Then he was gone from sight and Ingeman felt a strange and weary loneliness. He knew he had not mistaken what he saw in the Tugorian's eyes.

"Why did you let him go?" he demanded of Grandon. "This information almost knocked him cold. He won't recover for hours, and he won't think straight till he does. He's not strong enough for a shock that heavy. It may nullify the whole Tugorian experiment, at least in him."

"I've always believed the Tugorians should not have been admitted to the Council. Their Unity is inherently lacking. If what you say is true, it will prove my contention that you can't artificially induce a sense of Unity where it has never existed before."

"Dom's great great grandpa and family ate a whole crew of Earthmen the first time we landed there! They'd do it again if this feeble Unity of theirs got flattened hard enough."

"Dom's all right. He's not a failure, even if their Unity is weak. Besides, what would happen to yours if the machine suddenly came up with the order that Earth be flattened to a thin layer of brown atoms? Put yourself in Dom's place. A mind can't be expected to take a wallop like that without warping a little."

"Well, it is immaterial in the long run. We ought to make contact with the Tugorian colony if possible, and we can't spare anyone else to do it. If he requires it, Dom can be treated later. For the moment we have our hands full."

Grandon was right, of course, Ingeman admitted to himself. But his friendship with the Tugorian made a difference in knowing the

misery that Dom Figora's mind contained at the moment.

He turned his attention back to the panels and spoke. "How is the problem being attacked?"

"New auxiliary units are being thrown up in every colony to cross check on the standard computer banks with the same data. We should know very soon what kind of failure is involved. Heaven help us if it shows general replacement necessary in all banks. It would shut down the computer for months, but it doesn't seem possible that this should be required."

"The routine testboard procedures—they show nothing?"

"Wholly negative."

"How do you know the problem is structural?"

"Each colony is checking its own units for content on the question of data error. But that is a routine check. Nothing has come of it so far."

"Let me check the data personally, if you don't mind," said Ingeman.

"Certainly. Go ahead."

Grandon turned away to attend to the data being given by the creature who was, by rotation, the present Chairman of the Board. He was a twin-skulled creature from some world with which Grandon was not familiar. He had not seen the particular individual before this current problem arose.

At the Computerman's position,

Ingeman put on the thick-walled helmet that covered his skull. He pressed a quick succession of keys and spoke into the microphone that dangled before his lips—spoke in the common tongue of Synthetic which was understood by men and machines alike on the computer worlds.

The problem had been elaborately coded and inserted into the banks by the Tugorian colony hours earlier. Ingeman now asked for the resolution as determined by the logic engine.

It came through just as Grandon had said. He heard the pronouncement in Synthetic, and he saw the equation appear on the tape.

Let Tugorian IX be destroyed. Let Clopand's war destroy Tugorian IX. War.

The equation of insanity.

The only computer capable of handling the problems of the galaxies was insane.

After a moment's stillness he flicked off the keys and slowly removed the helmet from his head. He closed his eyes and was aware only of the small hum and click of the receptor equipment. He tried to picture his companions around the planet. There were a billion Computermen in attendance on the great machine, and every one of them was intent upon the same problem at this moment.

It was useless to attack the question of Clopand-Tugorian IX directly, Ingeman knew. It would take hundreds of hours of intense study

to comprehend the welter of facts involved and even then no single mind could be sure of having evaluated them all correctly.

But all that was unimportant—except to Dom Figora and his fellow Tugorians. Makeshifts could be arranged. Some kind of truce could be thrown up for the moment. It would wash out eventually.

The real problem was of far greater magnitude. Ingeman pictured the Council, the small group of creatures who formulated the basic instructions of the machine, who laid down the galaxy-spanning policies by which the Government sought to promote survival of all sentient life.

The Council relied on the computations of the machine. Its answers to them governed the destiny of worlds. Error here could mean the flicking out of life on a solar system. And how many errors had passed by them unseen—errors given out by an insane computer.

There was no way of knowing. And there was no way of trusting the machine again until this insanity was found and removed. Or, more important even than that, finding the mechanism by which insanity had been able to get into the machine, and removing that!

It seemed incredible that the routine test board procedures had not located it. An immense prodigality of equipment had been used in the construction of the machine. *What I tell you three times is true*, Hardon thought. That was the principle upon which it operated. Endless duplica-

tion of circuits was used to check and recheck computations, evaluate them and file them and rework them again. The computer was "errorless." It was physically impossible for it to be any other way.

Errorless—but insane.

The answer couldn't lie in the structure of the machine, he thought. It had to be in the data. Surely some of the computer colonies were attacking it seriously on that basis—apart from the cursory examination that Grandon mentioned. He moved to put the question to the Board Controller.

The phone, at that moment, sounded with faint alarm. Grandon jabbed at the button that turned the screen on. Only the highest priority calls were allowed through to him now.

Ingeman edged closer to the screen. He recognized at once the face and surroundings of the caller. It was Morrison, chief dockman. Through the window behind him could be seen one of the medium sized Fourth Order vessels used for official transport by the Computer-men.

"Mr. Grandon!" Morrison said hastily. "We have a priority demand for a ship here. It's being made by a Tugorian named Dom Figora. He said to refer to you for—"

Slowly the ship visible through the window began to move.

"Look out!" cried Ingeman.

Morrison swore and left the phone. In a moment he was in view run-

ning towards the control desk by the far window. The sleek vessel edged nearer the locked doors, its nose threatening to break the barrier that protected the colony.

Morrison rushed back. "The crazy fool is threatening to break through the lock if I don't open up. What's the matter with him, Mr. Grandon? What should I do with him?"

"Do the only thing there is to do," said Grandon quietly. "Open the lock before he breaks it down."

"The thing's crazy!"

"Yes," said Grandon sadly, "he is."

He touched the button and the image flicked off. "Better get Dom Figora on the phone and see if you can do anything with him. This is likely to be serious now. And you were quite correct: We should not have allowed Dom to go without medical attention."

Ingeman pressed the keys that put him on the interstellar band. He recalled the numbers painted broadly on the side of the ship.

"Calling cruiser SA 290. Dom Figora. Come in, Dom. This is Hardon. I want to talk to you."

As if waiting for the call, the Tugorian flipped his own transmitter switch and his face appeared on the plate. He reached up and turned his transmitter lower to better accommodate his short figure.

Ingeman could see the interior of the control room and Dom's tense face as he manipulated the ship

through the now open lock gates.

"Dom, where are you going?"

"Home," the Tugorian said simply. "I'm going home."

"Why? We need you here."

"The computer can no longer be trusted. *You* can no longer be trusted. You think you believe the computers are in error. Perhaps you *do* believe it, but in a few hours or a few days you will discover that there is no error. The computers are built that way. Haven't we always been so proud of our 'errorless' computers? Why should we doubt them now?"

"The machine says that Tugorian IX must die. I don't know why. Perhaps you never will, either. But I've got to warn my people. I have no access to any transmitter that will reach them. You will not let such word out until Clopand has attacked. Therefore, I must go personally."

"We'll have to stop you, Dom. We can't let you spread the word that would mean the undermining of the Galactic Council. Such news must never leave this planet. There would be havoc if this computation were broadcast. Decades of police action would not overcome it."

"You can't stop me. This ship's transmitters won't reach my home world, but they're powerful enough to touch a couple of galaxies. If a single ship takes off to follow me, I'll broadcast generally what I know before they can blast me. You wouldn't want me that bad. It would be better to let me carry word to my own

world than give it to random galaxies."

"No, we don't want you that bad. We don't want you bad enough to kill you. That's insanity, too, and we don't have to think that way. Come back and give us time to solve this problem. I promise that if we find no error you will be free to return to your people and no word or assistance will be given to Clopand. Rather, the entire police force of the Council will be used to break up the conflict."

The Tugorian snorted. "What kind of reasoning is that? If the machine is correct the police forces of the Council would be obligated to assist in the destruction of Tugorian IX!"

"And that would be utterly mad! So it isn't reasonable, is it? No matter how you look at it, the thing is insane. Come back and give us time to find the error. Help us find it."

The Tugorian shook his head vigorously. "When you come to the conclusion that the machine is without error . . . well, I have no way of predicting your actions then. But you are a Computerman and bound to put into effect the computations of the machine. That you have been my friend will have no significance in that hour."

"You're insane!"

Dom Figora's eyes seemed to widen in startled comprehension, then their light slowly dimmed. "Yes," he said, "you're right. I suppose I am—quite insane."

Ingeman regarded his friend. He regarded the thing that such a brutal thrust as the machine's computation could do to an already feeble sense of Unity. He felt again the frustration of trying to get near Dom Figora. It had always been the barrier of the pressure suit that kept them apart before. Now the barrier of shut off logic in Dom's mind stood between them, the most imponderable and the most terrible of all the barriers that might lie between sentient beings.

"We'll find the error before you reach home," Ingeman promised. "Keep in touch as you go. The police ships will not molest you, but when you get beyond communication reach of your transmitters we want to be able to notify you when the error has been found. Keep in contact with planetary relay stations."

"There'll be no need," Dom Figora said sadly. "But I give you my word—because of the friendship we've had."

He cut off abruptly leaving the screen blank. Ingeman had an instant's mental vision of the ship flinging away from the computer world as if from some hostile hive.

Grandon exhaled deeply. "So that's the end of the Tugorian experiment. The scheme to artificially induce a true feeling of Unity where none existed before is a failure."

"No! It can't be written off yet. This is no fair test of it."

"Nevertheless, we'll have to arrange for police interception of Dom.

He ought to know he can't get away with that. He can be hit before he even knows which way it's coming from. That shows what has happened to his thinking."

"But he *can* get away with it," said Ingeman. "If he forces us to kill him, he has won—"

"The only alternative to that defeat then is your promised solution before he reaches Tugorian IX. Considering his condition, I would say even that gives us little hope. But we have just six hours with his Fourth Order drive. There's little chance—"

"Is there any other plan for contacting the Tugorian colony?"

"No. I think they can be neglected now that Dom Figora is gone. They are self-sufficient and can survive and they are not essential to the solution of the problem."

"But I think they are!"

"How?"

"The machine computes incorrectly around Tugorian data. With the help of a Tugorian mind we may find it a lot quicker than otherwise."

"I don't agree that it is a problem of data. And have you considered the possible state of those Tugorian minds—?"

"Perhaps they don't know."

"I don't think we're that lucky. Entering that colony would be like stepping into a city of madmen. You wouldn't live any longer than the first Earthmen that landed on Tugorian IX."

"Nevertheless I'm convinced the

answer will be found there. May I go?"

"Of course. I'll make arrangements with the Board while you ready your ship. But—Hardon, I wish you wouldn't. It's a foolish and a dangerous thing."

"The computer breakdown is a dangerous thing. I'm willing to gamble a trip to the Tugorian colony on the possibility of data foul-up instead of structural collapse."

It was an hour's flight halfway around the planet to the Tugorian colony. Hardon Ingeman begrudged the precious time, but there was no other way to contact the people of Dom Figora. Not a single line of communication had been left open. Circuits to the colony were simply gone, burned out. Ingeman wondered seriously if the Tugorians had received the solution given by the computer before it cut them off. It would make a difference.

The black, basaltic surface of the planet glinted in the sharp sunlight. He flew no higher than necessary to top the stubby mountain ranges. These had been nearly leveled long ago when the planet died.

Archeological clues showed a whole system of fifteen planets that had once been alive and thriving. A war so old that the names of its participants could not be found had turned each world into a dead cinder. Life had vanished and the seas and atmospheres had puffed away into distant space.

Now, ten of the planets had become computer worlds, a fitting monument for the Big Brain, dedicated to the cause that such destruction should cease.

On this planet there were three million separate units of the computer which formed the basic administrative machine. Each unit was attended by a colony of Computer-men and their families, who represented their world in the Major Council. They were housed in a dome of whatever construction was required to duplicate conditions on their home world. Within each colony dome were the receptor units by which contact with the machine was made, but wholly separate in a dome of its own was the computer unit appended to the colony.

The colony domes varied in size to meet the needs of their occupants, but the computer domes were standard. They were squat structures three miles in diameter and four hundred feet high.

He watched the surface of the world as it sped beneath him. The black domes humped in mysterious formation as far as the eye could see. It was a scene of awe to one who knew the significance of those domes and understood the functions they performed.

How do you govern a galaxy? How do you guide an empire of island universes? In all creation there is scarcely a sun without planets. Only a handful of these solar systems is without life on at least one of its worlds.

Multiply them by the endless reaches of space. Compute the numbers of individual, self-determined creatures as spawn in the Universe.

No mind can hold that number. No being can contemplate and understand its significance. None can span but an infinitesimal part of the knowledge that defines those worlds and explains their myriad creatures.

And yet—with Fourth Order flight that can span the curvature of space they *must* learn toleration and go to far lengths to co-operate. That feeling of Unity in Life against the cold dead mass of Infinity *must* function.

Or they die.

Many had died. Others were dying even now, and slaughter would continue throughout the universe for millennia to come, but the trend had been reversed from death to life.

There was no recorded date so far determined in all the Universe marking the beginnings of space flight. At least four hundred thousand Earth years ago a race had used Fourth Order. That much was known. But that race died at the hands of another to whom it taught the science.

A science of the mind was had, too, among many worlds when Neanderthal crouched on the shores of Africa. Controls applicable to their own species were developed sporadically and the races devising them survived. They grew old and their wisdom spread, while contemporaries who could not be helped because of sheer numbers, waxed and waned and disappeared.

By their standards, Earth was young in race and science when Earthmen grasped Fourth Order and flung themselves across the galaxies. Their coming was observed and noted, and because their race was new and unique and their minds were keen, they were invited to the Galactic Councils.

In that day the question was still pondered: How can the reaches of space be tied together and sentient creatures be placed under a common law that will stop the burning of worlds?

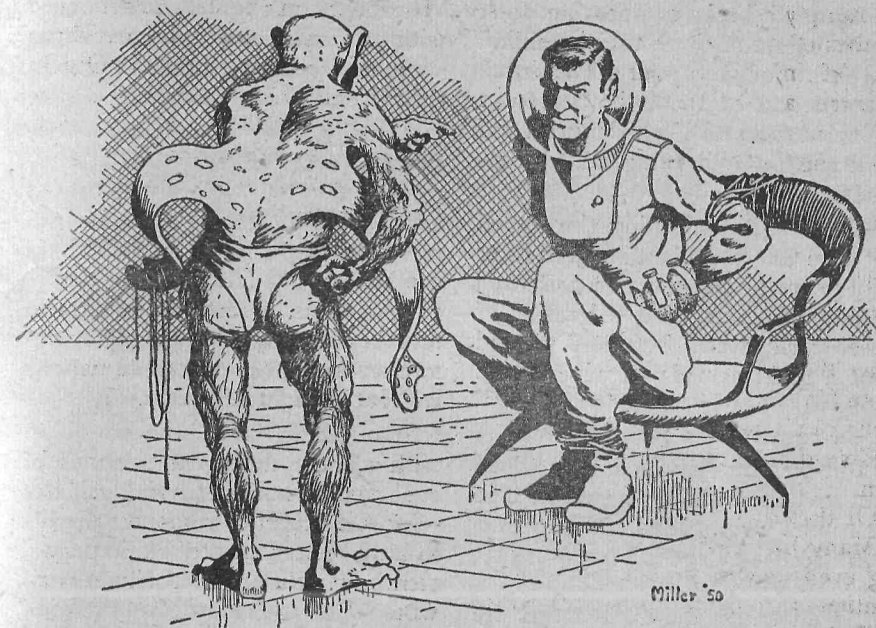
They knew the answer, but they could not affect it then. One tiny detail, just a single technique borrowed from the infant newcomer was sufficient to put the solution within their grasp.

The Mantell Synthesis, it was called a millennium and a half ago. It was devised to rebuild brains that were shattered, but the galactic councilors took a longer step. They used it to build a new brain.

A brain that occupied planets—encompassed a solar system.

The domes appeared like faint warts diminishing towards the horizon as Ingeman peered into the rising sunlight. They were the citizens of this dead world, he thought idly. The most rational citizens in all the universe.

They were immobile, and they were dead, but they could think, and they could think with the acquired knowledge of endless human life



spans. They could think no *better* than a man, but they could think with a mass of data that no creature could ever acquire. They could think well enough to govern a universe.

The Big Brain was not misnomer, for the domes were literally of the substance of mind. Long ago, the great David Mantell had shown that the basic information unit of the human brain is a single molecule. A giant protein molecule with sometimes hundreds of atoms arrayed, arranged and chained together in a precise pattern indicating data. A punched tape—a punched molecule.

And he showed these figurate molecules are more than this: Each possesses a natural period of reso-

nance that can communicate the information the configuration defines.

Much of this was known in several galaxies before Mantell's time. What was not known was the method of building such molecules, a way of forming them to contain precise bits of knowledge—and linking them up to extract that knowledge at will.

Such creation was the contribution of David Mantell and of Earth. It made possible the building of the Big Brain.

No single planet could have carried out the engineering feat involved. It would have strained the facilities of a solar system.

But the co-operation of galaxies accomplished it. Even then, the mere

design and basic engineering took the full time of more than a million engineers for sixty years. The actual construction of the basic computer occupied two and a half centuries and construction was being added constantly.

One tragic happening threatened to wipe out the giant project after fifty years of construction had been accomplished. A great federation of rebel worlds learned of the work and sent a giant armada to wipe it out. They very nearly succeeded, and half of the construction was destroyed.

But the armada was in turn wiped out, and the building resumed. The first units were staffed and in operation decades before the last were set up.

As an entity the entire structure was given only one soldered-in equation: The universe must exist, therefore life shall not be hostile to life. Then it was made self-checking and self-repairing.

Ingeman turned his eyes away from the blinding sun that ranged over the horizon and looked straight down upon the domes over which he passed. It was strange, he thought, that in every sentient mind discovered to date, including man's, there existed a built-in mechanism for avoiding the necessity of computing on a fully rational basis.

These mechanisms consisted of time-free, stimulus-response circuits capable of throwing in computations wholly on a basis of identity thinking.

Whenever the slightest interference with rational thought occurred the stimulus-response circuits threw in their identity computations.

Actually, they were simply fuse circuits, overload relays—but they worked far too well in almost all forms of life. They were far too ready to throw out the sometimes cumbersome, "I tell you three times" computations of sentient minds, and toss in their own simple, idiot answers. And they operated wholly without thought of others.

It ought to have been possible—with all the divergent schemes of evolution at work in myriad galaxies—for the stimulus-response circuits to have been displaced and improved somehow. But not a single race whose data was recorded in the computer banks had shown the absence of them. Never was the purely rational thinking mechanism in existence alone.

But, watching the domes, Ingeman reflected that the handiwork of man had far surpassed nature in producing a thinking mechanism. The Big Brain *did* think—but never with stimulus-response circuits. Its overload relays were simple automatic protective circuits that guarded against overload, cutting out units of the mechanism when threatened by physical malfunction. At such times the automatic repair facilities swung into action, correcting the difficulty. When they were through, the overload relays released the unit back to normal operation.

It was as simple as that. No engineer would have dreamed of designing the machine so that it *thought* with its protective circuits, yet that was exactly the way the human mind and all other sentient minds were built. The stimulus-response circuits somehow substituted for the thinking circuits irrationally and unpredictably.

He almost wished, however, that it were that kind of difficulty with which he had to deal now. It would be a simple matter to find any overloaded and displaced circuits. It would be simple to spot the idiot computation of an s.r. circuit—provided the biological type existed in the machine and was doing its thinking for it.

And then he froze in absolute immobility. *What was the computation on the Tugorians if it wasn't sheer stimulus-response thinking?*

It couldn't be, he thought more slowly. There simply was no mechanism by which it could be done.

Any structural failure, such as Grandon hoped to find, could only be of the kind in which an identical part of each of the triple circuits involved in the computation had broken down, thus defeating the self-checking feature of the machine's design. But that was wholly absurd. Such difficulties would show up instantly in a thousand ways. The machine was built to report and correct such things—and it did.

No, his original thought had to be correct. Something was wrong with

the stored data on the Tugorians. Data filed depended upon the Computermen who inserted it. The data was given independent triple checks before acceptance, but there were sometimes subjective connotations that could not be eliminated. None had ever been of this magnitude before, but that didn't bar the possibility.

It *had* to be possible. There was no other acceptable answer.

The Tugorian dome was no different from any of its endless companions. The only identification was the constant pattern emitted from the stubby towers.

Ingeman searched the spectrum with the identification receiver for several seconds, but the Tugorian towers were utterly dead. Power to the entire dome must be off, he thought. In that case—

The colony was dying!

Grandon had not considered this. He had merely supposed the computer receptors had been cut out, not that the entire power supply had been removed.

As he circled slowly over the area, Ingeman checked the catalogue and identified another dome adjacent to the Tugorian one. With that as landmark, he swung the ship down towards the bulge that marked the atmosphere locks on the dome he wanted.

Quickly, he donned a suit as the ship settled on automatic controls. He closed the last fastener as the

faint jar of landing shook him gently.

The weird and barren landscape was sharp with spears of light and dark, burned shadows. Always, outside the domes, he felt it fitting to watch for the ghosts of those who had once planted green things and swum in oceans here. He wished he might see one just once and ask for what he died.

His own shadow was long in the morning light as he advanced to the lock door. He had given the entrance signal before landing, expecting no answer. The lock remained sealed as if for all time.

He moved away from the great spaceship doors. Nearby was a small chamber for personnel use. It was seldom opened in any colony for there was little need to roam the forbidding planet outside the domes.

He tried the lock, then bent down for close examination. The power lock was holding. But that was not right. It should have released when the power went off.

It was almost as if the Big Brain had tried to seal the Tugorians in forever, as if it hated them. And he *would* be seeing ghosts among the stark morning shadows if he kept up that kind of thinking.

Nevertheless, he felt anxiety over the fate of the colony. It would be one big hell of a mess if the whole colony were wiped out on top of the machine's computation about Tugorian IX—plus Dom Figora's little journey to spread the glad tidings throughout the galaxies that the com-

puter had ordered one planet knocked off and who knows who may be next?

He thought of Grandon's warning question: "And have you considered the possible state of those Tugorian minds—?"

He considered it now as he walked on the frozen lava back to the ship. A colony of madmen. They would not yet be a colony of dead. But with the power off, and the atmosphere failing rapidly, they would be dying madmen. His own life might be very short indeed once he stepped inside those doors.

He wondered why the Tugorians had not sent out a ship to tell of their distress. The answer to that was almost too easy. They were afraid of their fellow Computermen. And that meant they had the computer's insane computation. Stimulus-response patterns had taken over their thinking, wholly blocking their weak, artificial sense of Unity.

It rendered wholly futile any attempt to estimate the circumstances to be encountered within the dome. There was no predicting insanity.

He returned with a small torch to apply to the seal of the lock. He could not avoid producing an atmosphere leak, but he tested quickly the hole he burned. Only a small rush of atmosphere came out, not the intense blow that would indicate the inner door was open.

He continued then, and in a moment the door was free. It swung inward. The chamber was dark—and

empty, too, he saw when he turned on his flashlight. He closed the door behind him and put a hand patch over the damaged area.

He did not hesitate to contemplate again what might be beyond the inner door. With the emergency hand wheels he opened the valves and filled the chamber. The door swung open.

They were waiting for him on the other side.

Four of them grabbed his arms. Two tackled his legs with a ferocity that for an instant seemed to have broken his bones. Although the Tugorians were as small as his ten-year-old daughters their heavy gravity world made them as strong as a baby elephant the same height. Ingeman's own weight doubled inside the dome and he crumpled instantly beneath the onslaught.

They bore him bodily to a corner of the dock room and bound him to a squat seat adapted to their own small size.

Groggy from the pain they had inflicted, Ingeman looked up at the circle of them pressing close about him. In their faces he saw the same terrible thing that had been on Dom Figora's. Stimulus-response control. They knew the computation.

"What is this for?" he said softly in Synthetic.

"We hardly expected such good fortune so soon." The Tugorian leader stepped towards him. His face was savage and his voice bitter.

"We want ships." The tusks

seemed to glint with reflections of every light in the room. "We want ships enough to get away. We want atmosphere to breathe before all our people suffocate. You cut our power and left us to die just as our world has been condemned to death by the great brain that was supposed to protect us. Now, you're going to help us—or die.

"I don't know why you came, but you'll get a ship big enough to carry all our people home, and you'll see that we're given safe passage. But first, you'll give us atmosphere.

"You will call at once and order the power resumed. If this is not done we will take four of our small scouts and rip through central dome and as many other as possible before we die!"

Ingeman felt a wondering pity. These were Computermen, the best of their race, insane with panic now. They saw themselves alone and beset by the most powerful enemy they could conceive, the computer itself.

"Why didn't you communicate such demands earlier with your ship transmitters?" said Ingeman. "They would have been obeyed."

The Tugorian snorted. "We tried. It was as if our signals were not even heard though we took all the power of the scout cruiser transmitters and put it through our main antenna."

"Your signals were not heard," said Ingeman. "You were cut off not only here but everywhere that you tried to make contact with the rest of the domes. The computer cut off your impulses on the receiving end.

Every ingoing or outgoing pulse is monitored and recorded by the computer banks, as you well know."

"The computer! You blame the machine now for your own obedience to it! You will use your ship transmitter and order Central to restore power. Now!"

They grasped his arms menacingly again, but he held up one free, gloved hand.

"I can do better than that. I have a medium cruiser with power enough for many hours for your colony. Run a line from my ship to the auxiliary power take-offs. You can tap it in fifteen minutes."

The Tugorians were stunned by this unexpected offer. "We hadn't thought of it," the leader said suspiciously at last. "Will your auxiliary fit the standard supply cables?"

"That's what they're designed for."

They hesitated only a moment, then moved hastily away, conferring with the frenzy of panic. Then Ingeman watched them move uncertainly away, passing out instructions and covering the detail of running a line from the ship to the power buss of the dome.

Like Dom Figora, he thought, they were creatures caught in a peril they could not combat. Grandon was right; they should never have been admitted to the Council. The experiment was a failure.

No one could have anticipated such a test as this. Their feelings might have countered blows less severe for generations. Perhaps it would have

grown in strength. There was no way of knowing. With present means it would never be known if this thing were for good or for evil.

The efforts at connection under way, the leader of the Tugorians returned to the dock room and stood by Ingeman. He seemed full of great weariness now that something was being done for their salvation.

"I think I know you," he said. "You are the friend of Dom Figora, are you not?"

Ingeman nodded. "I am Hardon Ingeman, and I am the friend of Tugorian IX."

The creature blinked, the hairless lids shuttering the eyes slowly as if he wholly discounted any statement Ingeman might make.

"I am Cro Douman," he said. "What has become of Dom Figora?"

"He is returning to your home world to warn them of the computations of the Big Brain."

Cro Douman looked up sharply and smiled with bitterness. "But you do not intend to let him arrive. You would not let such information be received—"

"No. We could not allow it."
"The police ships will blast him out of the skies."

"Yes—unless you free me from this position and help me to prove that the computation is in error. That is why I came."

The Tugorian remained silent. After a moment Ingeman went on. "You are wondering why we let Dom go out. He was my friend. Why did

I want him destroyed this way? He wasn't permitted to go. He stole a ship and forced his way out of our dome."

"That is good! Would that we all had Dom's courage!"

"What would you do? Suppose you steal a cruiser large enough to take your entire colony home. What will become of you? Do you suppose you will be permitted to reach Tugorian IX? Whether the computation of the machine is right or wrong, no word of it is going to be permitted to leave this planet. Can't you understand that?"

"I know what you say," Cro Douman nodded slowly, "but I can't understand it. Why should the computer demand our extermination? It makes no sense. It's crazy!"

"Exactly. You have understood better than Dom. The computer is insane. We've got to find out why. I think the answer is somewhere in your colony. It lies in checking machine data against the personal experience and knowledge of you Tugorians."

The Computerman looked dubious—and childishly hopeful. "What would you have us do?"

Ingeman struggled with his bonds. "Let me go, first."

The Tugorian hesitated, as if weighing the implied promise of a solution against the danger of releasing Ingeman. But they both knew that danger was insignificant. Four of the creature's appendages attacked the knots that held Ingeman. Then he backed warily, but Ingeman

made no move to rise. "That's better. Now get your suit on and come out to my ship."

The Tugorian obeyed as if he had passed the problem wholly to another mind and was thankful for a vague, blind hope that it might be solved. But Ingeman knew how tenuous that allegiance was. A moment's hesitation on his part, and the Tugorians would be on him again.

He led the way to the ship and approached the communicator panels in the control room. He called Grandon and reported what he had found. Grandon was not impressed by his continued insistence that the isolation of the colony proved functional failure.

"What do you intend to do now?" he asked. "Can the colony's resources be unsnarled, or will it be necessary to evacuate?"

"They can exist for the time being on the power supply of my ship. But the Tugorian Computermen have to have access to a receptor point, and their own cannot be made available in time."

"That's not important. We can't bother now with their lack of access to the problem."

"We must. I want the co-operation of one of the adjacent colonies. Let them abandon their receptor posts temporarily for occupancy by the Tugorians. Which one nearby can be most easily manipulated by the Tugorians?"

For a moment Grandon stood in silent forbearance. Although dis-

agreeing wholeheartedly with Ingeman's analysis, he could not—and would not—stand in the way of his fellow Computerman's investigation. Ingeman had the right of a free mind to pursue his course—and in the end some fantastic clue might be turned up by it.

Grandon turned to inspect the catalogue of colonies. "There's the Sumir colony north of you," he said. "They are of similar size and appendage development to the Tugorians, but their atmosphere is hostile. Suits will be required."

"That's good enough. Give them the word, will you?"

"All right. Be on your way. They will have agreed by the time you are at their lock gates."

"Any word of Dom Figora?"

"Nothing. He's spotted. The fleet will pounce when we say so."

Out of sight of the transmitter plate, Cro Douman heard the conversation. Grandon could not be warned to monitor his statements. Now, Ingeman faced the Tugorian again. Renewed rage showed on the savage face. His mouth formed a snarl.

"We have a time limit," said Ingeman decisively. "The speed of Dom Figora's ship. You will co-operate?"

Without uttering the snarl that came to his lips, the Tugorian capitulated. He moved along the companionway towards the hatch.

The Tugorians blasted open the sealed ship lock and slid the doors back. With golden light streaming

out behind them, four hundred of them began the two-mile march towards the Sumir dome.

It was like a scene out of some fantastic hell. Single file, they strode over the black corpse of a world, up jagged inclines and along miniature escarpments from which their long, dancing shadows were cast upon the valley floor. The line of marching figures twisted like a single living thing crawling over the surface of the dead world.

At the Sumir dome, the lock was open. A guide was ready for them. He was strange to Ingeman, who had never met one of the species before, but he was somewhat similar anatomically to the Tugorians.

He greeted Ingeman in the Synthetic language of the computer worlds. "I am Goldar," he said. "We are glad to accommodate you and hope your inquiry will meet with success."

"Thank you," Ingeman replied. "Your co-operation is kind, and we, too, hope that it will not be in vain. We will begin at once."

The four hundred Tugorians marched in file towards the receptor building. The streets were lined with Sumir who watched the weird procession in silent contemplation.

Within the receptor building, which was almost a duplicate of their own, they took stations. There, Ingeman outlined their plan of inquiry.

"Give no indication that you are Tugorians making the inquiry," he warned. "The computer will throw out this dome as it did your own if it

finds that out.

"Now, every Computerman has his assigned area of knowledge in which he specializes. I want you to extract the original data in each of your separate fields. Examine it, not from comparison with any other data in the banks, but from your own personal knowledge. Report at once anything that seems the slightest bit discrepant."

He dismissed them and they turned to the task.

"I want to work with you," Ingeman said to Cro Douman. "I want to go carefully in reverse chronology through each contact of Tugorians with the computer worlds. We will use a return system, in which we will go to specific time areas and recompute this problem with data available only at that time. We should be able to isolate the error in time, at least."

The Tugorian nodded hopefully. He was still suffering deep shock, but his confidence in Ingeman was returning, and his sense of unity with his fellow computermen was bolstered by it.

Ingeman was prepared with his own helmet since neither the Sumir nor Tugorian headpieces would fit him. He plugged into the panel and watched and listened while Cro Douman worked.

The Tugorian was an expert. Ingeman found no fault with his operation, injecting a suggestion only occasionally.

A Tugorian year at a time, Cro Douman backed down the history of

the computer, each time placing the data of war and Tugorian IX and asking for the available computations. It had been already established that Clopand was no factor.

The answer remained unvarying on the tapes: Let war destroy Tugorian IX.

They began to dip back at longer intervals. Time was being rapidly eaten up—both historical and present.

"Let's take it at the moment your world was admitted to the Council," said Ingeman. "That's the earliest contact between the computer and Tugorian IX."

Cro Douman cleared the board. He inserted the new data and pressed the computing key.

Instinctively, Ingeman leaned forward to catch the computation symbol by symbol as it appeared on the tape. He leaned back sharply and sucked in his breath as the final result appeared: Let war destroy Tugorian IX.

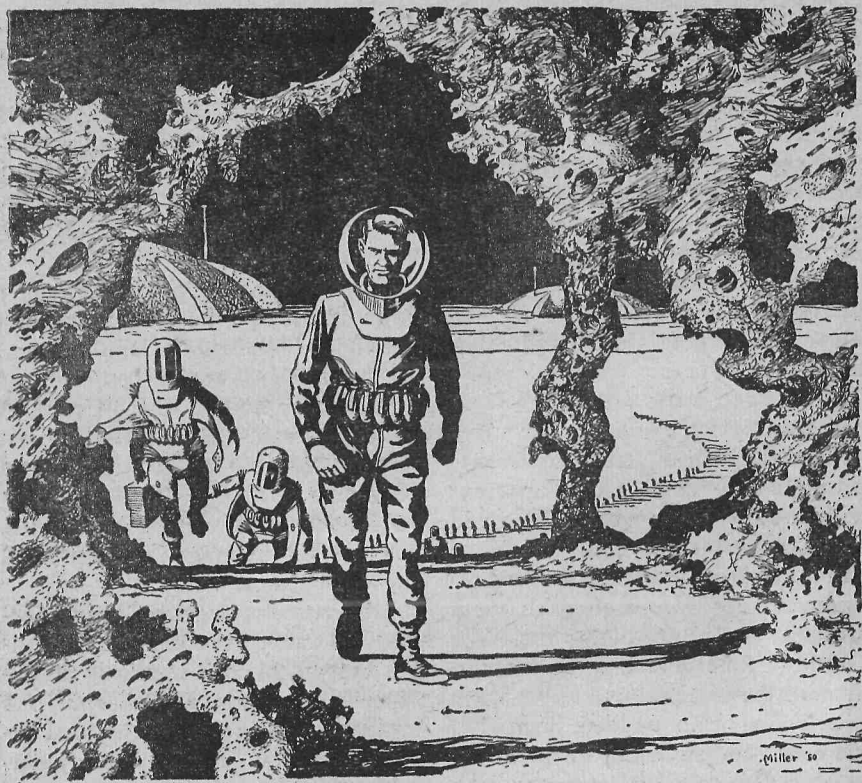
"Shall we try earlier?" said Cro Douman.

"Go ahead. Ask for it by earliest computations involving Tugorian. See if that makes sense."

Once again the board was cleared and set up. It resolved swiftly: The earliest computation on Tugorian IX was at the time of the planet's admission to the Galactic Council—which they had just examined!

Ingeman lapsed into his native tongue and slowly exploded, "I'll be damned!"

The Tugorian looked at him ques-



tioningly but said nothing. His mind, too, was laid blank by the inconsistency of the machine's operation. Then he inserted the datum: war, into the already presented information. Instantly, the resolution changed to the familiar pattern: destroy Tugorian IX.

"We can't get any earlier than this computation," said Cro Douman. "It just isn't in the banks. That's got to be structural error—or else the computation is correct—"

"Look: get it out of your head that

there is any possibility of correctness here. If there were, we could get the first moment of it and resolve the factors. If I didn't know better, I'd swear we were dealing with a human mind full of s.r. patterns. Hell! We are dealing with some sort of suppressed data! But how can anything be suppressed in these banks?"

Swiftly, his own fingers began jabbing at the keys. He called for the earliest time level on the computation. Instantly, the time factor vanished from the equations.

"Wonderful!" he murmured. "What will turn up next?"

"I would imply that the equation has always held—in the view of the computer. A 'so now, so always was, so always will be' statement. There has been no time at which my world's destruction was not computable."

"Equations with no time-statement are meaningless. It would imply that the computation held even before Tugorian IX was in existence, which is absurd."

He glanced at the clock, and at the indicator which would glow and beep when any of the other Computermen had anything to report. The clock was moving swiftly, and the indicator was dark and silent.

Cro Douman waited uneasily for orders and suggestions that his own mind could not draw out.

Ingeman touched the keys again. He put in the war computation alone, knowing at the same time that this was useless duplication of what thousands of other Computermen had done by now. He asked for the first war datum entered into the banks. The machine taped off a report on some interplanetary squabble he had never heard of, and it was many galaxies away from Tugorian IX. He watched it tape off one after another of the conflicts whose data had been so carefully recorded. There was enough on the single key word to consume the rest of his natural life.

He sensed defeat. Nothing of consequence could be extracted from the machine this way. If it was in the banks, it would not come out—and he

didn't know why. If it was not there, he would have to figure it out with his own mental powers.

He rose from the board, and as he did so he had the fleeting sense that the solution was lying right there in front of him and he had passed it by. He hesitated, then turned finally away.

"Continue on any tack that looks profitable," he said. "I'm going out to the computer dome."

Cro Douman looked up distrustfully as Ingeman retreated. The Earthman had been so sure the solution would be found. Now he showed the marks of defeat and the Tugorian's hope shrank. In equal ratio his rage rose as he sensed the presence of the enemy.

"Will you keep in touch?" he asked in sullen demand.

Ingeman nodded. "Call me on the standard intercom wave if anything breaks. I'll not be gone long."

He left the dome and stepped out. He wished he could have brought his ship. He was not sure why he was going. In itself, it appeared an irrational act at this moment.

It was a hunch that drove him. The inner necessity to examine the wild variables that sprang from every side. He wanted to look at the computer banks again, and he wanted to be alone with that sense of having actually seen the answer on the board and being blind to it.

The sun was higher now, but the lights and shadows were always intense. Light or darkness—death or

life—there was no halfway mark in anything that occurred on this barren world.

He walked over the basalt surface, picking his way carefully along a narrow ridge that looked like an endless wave of lava frozen in mid motion. His eyes scanned the bitter landscape. So deep was its oppression that he wished momentarily that the Council might have chosen a green and pleasant world on which to build.

He forgot for the time that a "green and pleasant" world would have been as barren as this one to nine tenths of the Computermen.

The sky above was as black as the cinder on which he stood and life seemed a tenuous thing; the struggle to preserve it, almost futile. If this planet was a monument to anything, it signified the futility of the struggle for survival.

He moved slowly up the incline, reached the peak and halted there. Before him was a sight that he had never seen except from the port of a high and speeding ship.

It was a ruin. The ruin of one of the computer domes that had been destroyed so long ago when warfare threatened the infant Council in the very moment of its triumphant building. He crossed a frozen crater and advanced up the hillside towards the dome. This wasn't what he had come to see, but it was an attraction that seemed somehow pertinent to the moment.

He stepped inside the blasted walls. This dome had been complete

and its memory banks almost finished when the blow came. They were still there as they had been a millennium and a half ago except for the warping produced by the intense heat and cold of the variant sun.

He passed by the long banks of containers which had held the protein structures. Dried and wasted gobs occupied the corners of the cans into which he peered. Little twisted wires remained of the artificial neuron system that linked the next infinite numbers of units within the containers.

Like some corpse of a dead, extinct animal, he thought. It was somehow difficult to identify this ruined mass with the delicate living structures with which he was familiar.

He wished for once that the computer *were* actually a living thing. How easy then would be the resolution of the present problem! This ruin would explain the war computation. Maybe Tugorian raiders had been the ones to strike the blow. They had belonged to the rebel federation then, he knew. Threatened with death, the great computer could have stored an identity s.r. computation linking war and Tugorian IX so that forever after the computer would be the enemy of Tugorian IX.

He wished it were that easy. But that would require a biological stimulus-response that the computer did not have. It would require an understanding of pleasure and pain and death—which the machine did not comprehend. It would require the admission of the machine to the

ranks of things living and sentient—and that was sheer fantasy.

He kicked idly at the long row of empty cans that had held protein molecules in gelatin suspension like the substance of a brain. They tore loose from the racks and collapsed in silent confusion upon the littered floor.

Sharp sunlight almost blinded him as he stepped from the shadows of the mausoleum to the basalt hill again. He stood there undetermined. Getting away from the Sumir dome had been fruitless. He had lost his original intention to see the computer dome. He had seen enough. He had seen a computer dead.

While he stood in fuming complexity of thought, the gentle beep of the radio alarm sounded in his ear. He switched his circuits open and answered.

"Hardon Ingeman."

"This is Cro Douman. Grandon is on the circuit."

"Go ahead."

"Hardon, this is Grandon. Have you found anything?"

"No. You?"

"Not yet. I called to say that we've got to go after Dom Figora. He has about reached the limit of safety. I'm sorry."

This bleak hill, and this torn ruin made a wonderful site to receive such word, Ingeman thought. Creatures have fought death for ten times ten billion years, and to go on fighting it we have to embrace it. But he couldn't tell Grandon to stop. Dom

could not be allowed to spread his message, and there was nothing but death that would stop him. Yet—

"Wait," said Ingeman quickly, "there's one more thing. I should have thought of it at first."

"We can't wait any longer."

"Call my home and get Leatrice to bring the kids to the dome. Put them on a circuit. Tell them what's happened and get them to beg Dom to hold off until we have time to finish our work. He loves them. If anything will stop him, that will."

"All right, if you want to try it maybe we can spare that much time. But no more."

"Call me as soon as contact is ready. I'll get to a plate."

He switched off and turned to the landscape behind him. The computer dome which had been his original goal was a quarter of a mile distant over the basalt crags. He broke into a clumsy run.

The single attendant whose boring task was to maintain manual watch over the computer banks admitted him with an expression of welcome. He was a Sumir, and a gregarious fellow. There were few indeed among all the Computermen who had any love for the solitary and almost wholly inactive watch that rotated among them.

Ingeman didn't bother to explain his presence so far from his own dome. He asked for a communications position and was granted it. He got Cro Douman in contact on a standby circuit.

When contact was made again he saw the interior of the Terrestrial receptor building. Leatrice was there and the children were being briefed by Grandon on what was desired of them.

The twins were crying softly now under the impact of the news of Dom Figora. George was white faced, but stiff lipped as he nodded understanding of Grandon's instructions.

The Computerman turned then to the business of contacting the fleeing Tugorian through the relay stations nearest him. It was minutes before his image appeared, and now it was foggy and shifting from the effects of the tremendous distances his ship had covered in the hours since he left the dome.

Dom Figora could see them all, including Ingeman, and he guessed at once their purpose. His face moved with pain.

"Uncle Dom," George said quietly, "you were going to eat with us Sunday and play ball again. You promised."

"I had to go away quite suddenly," said the Tugorian. "I guess I won't be seeing you again, children. You'll have to find you a new uncle. That shouldn't be hard because there are lots of Computermen who would like to adopt three nice Earth kids."

The twins had been shaken out of their despair, and now they advanced to the plate together, shoving George aside.

"You're not being fair!" said Irene. "They told us what you are running away for. You're completely

crazy if you think we're going to come over and blow up your world just because a stupid machine says so. Come on back here before you get yourself killed!"

Dom's eyes flickered for just an instant and then he recovered. But Ingeman felt suddenly heavy within himself. Irene had given them away. Now, Dom *knew*. He would make an attempt to broadcast a warning any moment now—

But he resumed speaking in a dry voice, and the fear seemed to have left him as if some great decision had been made and left him clear of conscience.

"Your father has remarked upon the state of my sanity, and I have agreed with him. There's nothing your Uncle Dom can do about it, kids. I wish they hadn't brought you here. It would have been so much nicer if our good-by last evening had been the one to remember. There was no need of your knowing this early in life that things can be quite as tough as they sometimes are."

He turned his eyes quickly to Ingeman before the children could break in again. "You haven't found anything, of course, Hardon, or you wouldn't have brought the children here. Frankly, I'm puzzled by your doing it. There must be things I never understood about your race, but it's undoubtedly too late to learn them now."

"Our estimate of the situation has not changed," said Ingeman. "I have contacted your colony and they are

co-operating. Cro Douman, come in!"

The Tugorian colony leader appeared suddenly on the screen.

"Tell him to come back!" Ingeman said.

The Computermen from Tugorian IX stared at each other for long moments on the screens. Then slowly Cro Douman shook his head.

"I cannot. I cannot tell you to return, Dom Figora. Do as you think best. We have co-operated here because Ingeman has promised a solution. But we have not found it. They'll kill you, Dom, but you have no choice but to do that which seems best to you."

Then Dom smiled for the first time. "It does not matter now. While you have spoken my taped message has been sent. Our world is warned. We may not survive, but neither will those who attack us!"

Ingeman felt physically sick. The work of centuries was undone. It did not matter now that the proper answer would be found in due time. The Big Brain was branded in the minds of unlimited worlds of aberration as a thing of equivocation. Worlds which had not known of the computer would learn of it now as a thing to hate and fear. Never would those generations, trust it.

Figora looked directly at Ingeman. "I'm sorry," he said. "I did what seemed best. I have thought through many long hours of the things you have tried to make me believe. I have recalled the days when the computer

was building and it was the Tugorian fleet of the rebel federation that blasted the computer worlds.

"If your premises about data were correct, or if the computer were a sentient thing, it would have reason for revenge upon Tugorian IX. It could then compute that my world should die in revenge for the attack. It should have so computed long ago.

"But we know that the computer is without emotional capacities. We know that its stimulus-response circuits do not compute on identities which mask rational answers, as do minds of men and Tugorians. Your explanation, I concluded, could not be true. And so I did as I have done. Have I not thought correctly on my premises, Hardon Ingeman?"

Somewhere a piece of the puzzle was trying to fall into place. Ingeman felt it as a jagged thing floating in his mind. But no where yet did it fit. The thing that Dom Figora had said was the thing that he had speculated on at the ruin. But the Tugorian was right: the machine was incapable of acting on such a basis—

The jagged piece wouldn't fit.

"I have no more to say," said Dom Figora. "Your police may come for me now. I'll be ready."

He cut off abruptly, and his section of the plates went blank. Ingeman continued staring for seconds longer as if to persuade himself that he had not heard and seen those things his senses reported.

Then, incredibly, he was aware that Grandon was grinning at them.

"That takes care of him," Gran-

don said. "He thinks he sent out word of the computation. The police were ready for that. They hashed and garbled his message beyond any comprehension. They'll pick him up when he lands and hold him on ice until we straighten things out here."

His face sobered as he addressed Cro Douman then. "You have seen the evidence of our good will and our decision," he said. "We have no belief in the necessity of harming any of your people or your world. Therefore, I hope that no one else will undertake such a journey as Dom Figora assumed, or attempt the spreading of this erroneous computation."

The Tugorian seemed crushed beyond recovery of spirit. He had no faith in the words of Grandon. "You will help restore our dome?" he said monotonously.

"At once. Let your own technicians do what they can to repair the damage. Then call for such outside assistance as necessary from the general technicians' pool. Is that satisfactory?"

The Tugorian nodded slowly. "All but the computation—"

"We'll find the answer to *that*. Hardon, are you going to continue that wild goose chase of yours, or are you going to help us in some useful way?"

"The answer's here. We'll go on as we are."

"Let me know when you find something."

He left the dome without waiting

to make conversation with the lone Sumir on duty. Outside, he stood on the hill again, looking towards the smaller rise where the ruin stood.

So a Tugorian fleet had done it, after all, he thought. Somewhere that fact made sense—

Some of the pressure was gone, now. Dom Figora was safe and there was time to think. The threat to his friend's life had cut down his ability to think. Now he felt a sense of relief, a fitting together of the puzzle. All but the one jagged piece that wouldn't slip into place—

And then it *did*.

It spun into the vacancy to which it belonged, just as it had been trying to do ever since it first appeared.

The ruin—the ruin and the Tugorian's guilt. It had been sitting right there in front of his face ever since he'd sat at the computing tables with Cro Douman!

There he had asked for the first contact between the computer and the world of Tugorian IX. The machine had reported the admission of the Tugorians to the Council.

But there was the far earlier time when Tugorian IX attacked the computer worlds, and the banks wouldn't give up that data. That meant suppression for the data *was* recorded and the machine was computing with it! And the equation was timeless—

He began to laugh then. He laughed at himself, the delay of his mind in working at the problem like a rat struggling through a maze. He laughed at the ruins of the computer dome, and the wild, burned planet

upon which he stood.

And his laughter showed how great and terrible the pressure had been.

With it still in his throat he started on a run towards the Sumir colony.

Cro Douman met him there. "I'm sorry—" the Tugorian began. "I'm sorry I couldn't—"

"Never mind. It's all right. We've got the answer now."

The Tugorian's dread melted away as he looked upon Ingeman's face and watched the Earthman sit before the communication panel once more. But Ingeman switched to private helmet circuits.

He called Grandon. The Computerman answered almost instantly. "I was calling *you*. For a minute we thought we had something along your line of thought. That remark of Dom's about the Tugorian fleet blasting the computer during construction— But it didn't turn out, after all."

"It did! It will! That's the answer."

Grandon shook his head. "We tried to remove the erroneous data from the banks, but nothing happens. It won't come out. The computation remains the same."

"How did you try to remove it? It *will* come out!"

"We called for standard removal of all Tugorian war data with respect to the computer. Nothing happened. The data isn't there, after all. And the computation remains the same."

Ingeman laughed heartily, almost

in a tone of triumph that made Grandon stare quizzically. "You know a better way?" said Grandon.

"You're right—there's nothing there—in the place you looked, anyway. You were searching the standard banks. The data is in the stimulus-response circuits!"

Grandon snorted in derision. "S.r. circuits! Now *you've* gone off. This is not a human mind that's gone insane!"

"Look," said Ingeman carefully. "Set up the problem exactly as we have been trying to work it all along. Punch it through to computation finish. Leave the board set up that way, and then punch the erasure tab to remove everything you have there."

Dubiously, Grandon did as suggested. Then he looked up. "Well?"

"Now clear the board and rework the problem."

He obeyed tolerantly, watching the tape with bored attention as it ran out the printer. Then he leaned forward with a gasp. "It's different! It says . . . it says to let Tugorian offer to buy out Clopand's alleged rights. Clopand will accept and it will be satisfactory to them and profitable to Tugorian IX. It computes a figure of fifty million. Hardon, what happened? Why the devil didn't we hit on so simple a thing long ago?"

"Basic answers are always simple. Sometimes so simple they sit right in front of your face for days before they are seen. We're dealing with a stimulus-response computation whether we like it or not."

"We can't be! The machine wasn't built that way."

"This machine was designed to think. We know it thinks—in the strictest biological sense of the term. And it has been known for centuries that any true thinking mechanism *must* be a slow-learning mechanism—it must *not* learn the first time. You'll get very poor answers indeed if the mechanism learns the first time it tries for a solution. That's the whole basis of the 'what I tell you three times is true' mechanism on the data input banks—a completely different reason for the three-times-or-more than the simple mechanical triple-circuits of the computing chains. They are tripled simply for cross-check on computer function. But the three-times-told mechanism on the data banks is to provide the essential slow-learning mechanism.

"An instant-learner mechanism, one that learns the *first* time, can mis-evaluate the data, and get wrong answers, or at least not the best answer available. In any complex situation, it is almost certain to do so.

"What we call a stimulus-response circuit is nothing but an instant-learner circuit; a mechanism that learns that now A plus B means C—and holds that as a permanent set of responses. A plus B *always* means C to such a mechanism, because it once meant that."

"Certainly," Grandon said patiently. "I've studied elementary theory also."

"Well, the Big Brain hasn't, un-

fortunately. Or rather, it couldn't help it."

"But it is most carefully designed, by a multitude of engineers, to avoid any possibility of instant-learner, stimulus-response circuits. They were never built into the computer."

"Unfortunately, they were."

Grandon looked out of the plate with an expression of quizzical alarm. "Oh?" he said.

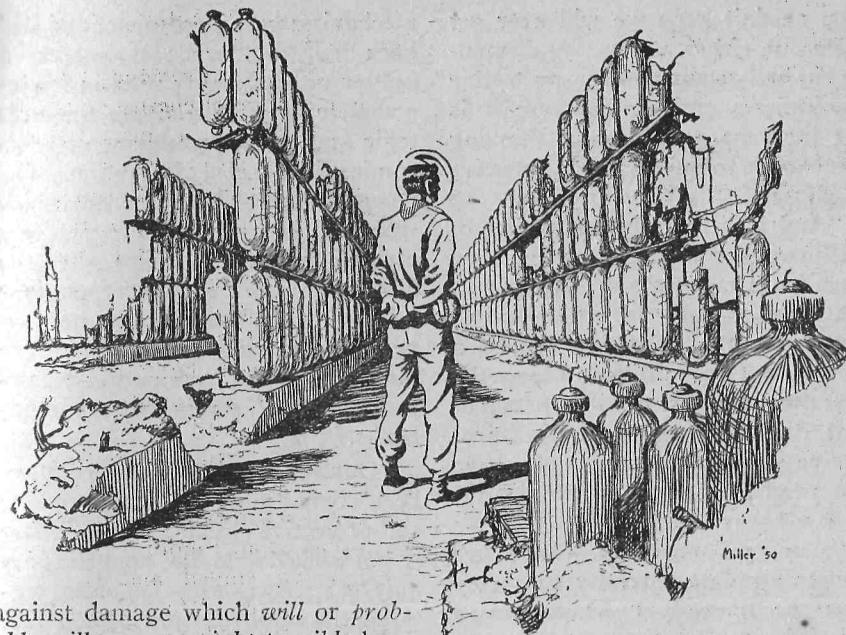
"The engineers built a few; the Big Brain itself built in the rest—following the specifications the engineers laid on it."

"Ingeman, either you're implying sabotage a millennium and a half ago, or you are in need of more attention than Dom Figora was."

Ingeman smiled and shook his head. "Neither. We've been failing to follow through to its logical conclusion the inherent necessities of a thinking mechanism. We've found those stimulus-response mechanisms in every intelligent race we've ever found; it would have been to our advantage to recognize them for what they are—the necessary concomitant of a perfect thinking mechanism.

"The Big Brain here is intended to be self-protecting—designed to be, and originally instructed to maintain itself. It was instructed to think *about* itself, in other words.

"Now if you give a high-order thinking mechanism like the Big Brain instructions to protect itself against damage, surely you don't expect it to protect only against damage which *has* happened; it must, under that instruction, protect itself



against damage which *will* or *probably will* or even *might possibly* happen. Naturally—a mechanism as enormously valuable as this must be designed for the ultimate in fool-proof, self-protective, self-repairing facilities."

Grandon's face was slowly changing its expression. Ingeman's smile broadened.

"Grandon, have you ever had the control wiring back of the main pilot panel of your scoutship short out when you were less than one hundred miles from planeting?"

"No. Why—no, but what's that got to do with it?"

"What would you do if it happened?"

"Hit the main cut-off on auxiliary power, and the Fourth Order main

drive studs. Get distance first."

"You had that answer figured out beforehand?"

"Why—yes, I've thought of that sort of emergency."

"Grandon—you have a stimulus-response circuit built into your mind; you built it in yourself, for use in a possible emergency. You visualized a possible emergency, thought out the proper response, and set it in as a 'response' to the envisaged 'stimulus.' Being a high-order thinking mechanism yourself, as part of the natural duty of any thinking mechanism you built in self-protective stimulus-response circuits.

"The Big Brain has done the same.

You needn't hope we will ever get them out, either, unless you dismantle the self-repair and self-protective mechanisms entirely. Because it is the inherent need of any thinking mechanism to build in self-protective responses.

"And it is the inherent nature of self-protective mechanisms that they must be instant-learner mechanisms. An overload relay isn't designed to blow open the *third* time there's a ruinous overload; it has to blow the first time—the first possible instant of that dangerous overload. Self-protective circuits unfortunately have the need for straight stimulus-response behavior.

"Also, unfortunately, they have the unfortunate necessity that they *must be timeless*. Overload relays must always, invariably, and at any time respond to their appropriate stimulus. Any self-protective circuit—such as your 'what to do when circuit failure near planeting' circuit—must be a permanent, ready-at-all-times circuit. It must be divorced from time.

"The perfect, self-maintaining, self-repairing, self-protecting thinking mechanism unfortunately is automatically imperfect in that degree.

"In this present instance, the Big Brain was working on a self-protective circuit it installed fifteen hundred years ago: War plus Tugorians means destruction of computer. Solution: destroy Tugorians before computer is destroyed.

"At the time that computation got into the mechanism, of course, the

mechanism was incomplete, and had been half destroyed; it was, as a matter of fact, being used in its incomplete form to compute the strategic and tactical problems of overcoming the rebel federation. The computations on that problem which were fed in by men were properly cleared from the machine after the war was ended. But the computations set up by the machine for its own protective circuits at that time were installed in the service-and-repair-problems level, *not* in the main data-banks.

"Our super-colossal idiot here has been computing on the basis of that self-protective circuit ever since. But it got kicked into the computations only when war-with-Tugorians entered the main circuits. When that finally happened, naturally the self-protective circuit threw in the data that, for maintenance of the computer, Tugoria IX must be destroyed, and the computer proper then added specifications on how Clopand should do it."

Grandon looked more and more appalled as the realization of the scope of the problem settled on him. "We can't trust the computations of the Big Brain, then—at any time some of those self-protective circuits may be biasing the evaluation networks, putting false importances on data. But we *have* to have the computer, we have to be able to rely on it! We've got to rip out and scrap all the self-protective devices, and put living intelligences on as maintenance

and repair technicians!"

"That's impossible, Grandon, and you know it. You're going to have to live with the Big Brain as a self-maintaining, self-protecting—entity. The circuits of this computer are too complex for any living intelligence to service; only the computer itself is complex enough to find its own faults.

"No, the solution is to install some circuit system whereby the data and solutions in the service-and-repair section, the stimulus-response memory storage units, can be automatically rerun through the main computer system at regular intervals for re-evaluation.

"As a matter of fact, that should have been done long ago. Remember that a stimulus-response pattern tends to get set, and stay set. Some of the self-repair patterns must still be based on technology of fifteen centuries ago. They undoubtedly work, but I'm safe in betting that data now available in the main data banks, on discoveries developed since the original construction, would improve the entire mechanism.

"Do that, and I imagine there is going to be a furious lot of activity in the automatic repair mechanisms for the next few decades. But before that repair job is done, we'll have to run all the self-defense circuits as problems for solution in the main computer."

Grandon nodded, and lapsed into silent thought.

"Which brings us up to the question of Dom," said Ingeman after a

time. "What's happened to Dom Figora?"

"He ought to be about ready to land. The local police will pick him up and put him away until he's straightened around."

"But that doesn't solve the problem of Tugorian IX, does it?"

Grandon shook his head regretfully. "Nothing will solve that, now. It's one for the machine, but we'll have to do something with the Tugorian colony while we get an answer.

"I was right, of course, about them. They have no sense of Life Unity worthy of the name. Trying to induce one was a good try, but the experiment is a total failure. They can never be trusted again to live among other sentient beings. This was a heavy blow, but even smaller ones might swamp them. When you were concerned with Dom at first you asked what I would do if the machine computed Earth's destruction. You can answer that now?"

"Of course," said Ingeman in a now weary voice. "You and I would stand up on our hind legs and challenge the computation for ourselves just as we did for the Tugorians. I wonder what will become of the Tugorians."

"If we try to kick them out of the Council, it will be almost as bad as if the machine had actually computed their destruction. My guess is that they can be left on a dummy circuit not affecting the computer. Eventually, perhaps the experiment *will* work, or they can be eased out. I

don't know. I'm glad I don't *have* to figure that one out."

Ingeman called Dom Figora before leaving for his own colony. The Tugorian was in custody and he came to the transmitter plate with a strange mixture of remorse and ecstasy on his face.

"You won," he said, "and I'm so very glad. I almost made an awful mistake."

Yes, Ingeman thought. Dom had almost made a terrible mistake, and he would go on making them or almost making them for the rest of his life.

The Earthman watched the face of his friend, seeing it as Leatrice must have seen it. The fangs were just faintly yellow, an animal color that could never be bleached out, just as a basic sense of distrust could never be bleached from the Tugorian's mind.

With respect to other forms of life, the Tugorian was insane. All else but the Tugorian species was their natural prey. Dom's great great grandfather had eaten Earthmen alive. Dom himself—

Ingeman recalled the thousand times the Tugorian had played alone with the twins and George.

"I keep thinking he's about to eat one of the children," Leatrice always said.

If something had arisen suddenly to swamp Dom's weak Unity—

Something *had* arisen now, and Ingeman knew that he and Dom had

parted for the last time. Never again could he safely predict the little Tugorian.

"I guess I won't be able to come for that Sunday dinner," said Dom, "but I'll be out of here by the time you pass through this galaxy on the way home. You can stop with us for a few days. I've already spoken to my chief wife."

Ingeman was shaking his head. "I'm sorry, Dom, but I guess we won't be able to make it. We've decided to try to make it home for the fall term of school. We're taking the Express out of here on Saturday. Its first stop is halfway to Earth. We won't be seeing you again, I'm afraid."

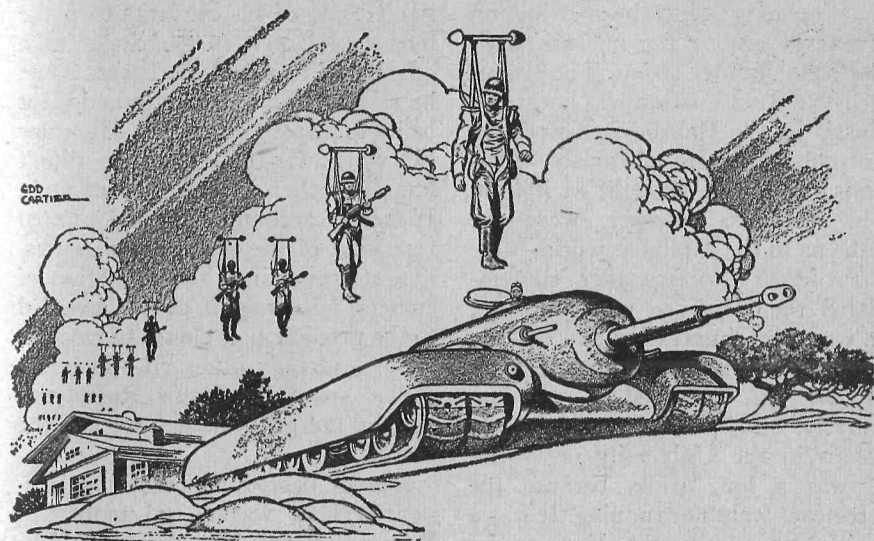
The Tugorian was silent, watching the Earthman for a long time. Did he understand that this was a hurriedly concocted excuse, Ingeman wondered. Did he understand that his species had to be dropped from the Councils of the Universe?

What went on behind those saucer eyes now? What kind of thoughts did the Tugorian think of Earthmen, of Ingeman and Leatrice and the children? There was no way of knowing, no way of ever knowing.

But Dom Figora raised no question about Ingeman's decision. He merely nodded as if in understanding.

"Tell the children I looked forward to their coming," he said at last. "Tell them I will miss them very much. You'll tell them that for me, won't you, Hardon?"

THE END



HISTORICAL NOTE

BY MURRAY LEINSTER

The professor had a mathematical idea; it was sabotage to think it up. Because the thing was no good as a weapon, but perfectly deadly just the same!

Illustrated by Cartier

Professor Vladimir Rojestvensky, it has since been learned, remade the world at breakfast one morning while eating a bowl of rather watery red-cabbage soup, with black bread on the side. It is now a matter of history that the soup was not up to par that day, and the black bread in Omsk all that week was sub-margi-

nal. But neither of these factors is considered to have contributed to the remaking of civilization.

The essential thing was that, while blowing on a spoonful of red-cabbage soup, Professor Rojestvensky happened to think of an interesting inference or deduction to be drawn from the Bramwell-Weems

equation expressing the distribution of energy among the nucleus-particles of the lighter atoms. The Bramwell-Weems Equation was known in Russia as the Gabrilovitch-Brekhov Formula because, obviously, Russians must have thought of it first. The symbols, however, were the same as in the capitalist world.

Professor Rojestvensky contemplated the inference with pleasure. It was very interesting indeed. He finished his breakfast, drank a glass of hot tea, wrapped himself up warmly, and set out for his classrooms in the University of Omsk. It was a long walk, because the streetcars were not running. It was a fruitful one, though. For as he walked, Professor Rojestvensky arranged his reasoning in excellent order. When he arrived at the University he found a directive from the Council of Soviet Representatives for Science and Culture. It notified him that from now on Soviet scientists must produce more and better and more Earth-shaking discoveries—or else. Therefore he would immediately report, in quadruplicate, what first-rank discoveries he was prepared to make in the science of physics. And they had better be good.

He was a modest man, was Professor Rojestvensky, but to fail to obey the directive meant losing his job. So he quakingly prepared a paper outlining his extension of the Bramwell-Weems Equation—but he was careful to call it the Gabrilovitch-Brekhov Formula—and per-

suaded one of his students to make four copies of it in exchange for a quarter of a pound of cheese. Then he sent off the four copies and slept badly for weeks afterward. He knew his work was good, but he didn't know whether it was good enough. It merely accounted for the mutual repulsion of the molecules of gases, it neatly explained the formation of comets' tails, and it could have led to the prediction of clouds of calcium vapor—already observed—in interstellar space. Professor Rojestvensky did not guess he had remade the world.

Weeks passed, and nothing happened. That was a bad month in Russian science. The staffs of Medical Research and Surgical Advancement had already reported everything they could dream up. Workers in Aerodynamic Design weren't sticking out their necks. The last man to design a new plane went to prison for eight years when a fuel line clogged on his plane's test flight. And Nuclear Fission workers stuck to their policy of demanding unobtainable equipment and supplies for the furtherance of their work. So Professor Rojestvensky's paper was absolutely the only contribution pad-dable to Earth-shaking size. His paper itself was published in the *Soviet Journal of Advanced Science*. Then it was quoted unintelligibly in *Pravda* and *Tass*, with ecstatic editorials pointing out how far Russian science was ahead of mere capitalist-imperialistic research. And that was that.

Possibly that would have been the end of it all, but that some two weeks later an American jet bomber flew twelve thousand miles, dropped fifteen tons of simulated bombs—actually condensed milk lowered to Earth by parachutes—and returned to base without refueling. This, of course, could not be allowed to go unchallenged. So a stern directive went to Aerodynamic Design. An outstanding achievement in aviation must be produced immediately. It must wipe the Americans' decadent, capitalistic eyes. Or—so the directive said explicitly—else.

The brain trust which was Aerodynamic Design went into sweating executive session, seeking a really air-tight procedure for passing the buck. They didn't want to lose their jobs, which were fairly fat ones, any more than Professor Rojestvensky had. They had to cook up something in a hurry, something really dramatic, with an out putting the blame squarely on somebody else if it didn't work. They couldn't blame Aviation Production, though. The head of that splendid organization had an in with the Politbureau. Something new and drastic and good was needed.

In the end a desperate junior official began to hunt through recent Soviet contributions to science. If he could find something impressive that could be twisted into an advance in aerodynamics, it could be designed and built, and any failure blamed on the scientist who had furnished false data as a form of alien-inspired sabo-

tage. Scientists were always expendable in Russian politics. It was time to expend one. Largely because his name was on top of the pile, Professor Rojestvensky was picked.

This, in detail, is the process by which his extension of the Bramwell-Weems—or Gabrilovitch-Brekhov—Equation was selected for practical development. Our brave new world is the result. Aerodynamic Design borrowed a man from Nuclear Fission in a deal between two department heads, and the Nuclear Fission man agreed to work up something elaborate and impressive. He set to work on Professor Rojestvensky's figures. And presently he turned pale, and gulped very rapidly several times, and muttered, "*Gospody pomilov!*" That meant, "Lord have mercy on us!" and it was not a good Russian expression any longer, but it was the way he felt. In time, he showed his results to Aerodynamic Design and said, in effect, "But, it might really work!"

Aerodynamic Design sent him out to Omsk to get Professor Rojestvensky to check his calculations. It was a shrewd move. The Nuclear Fission man and Professor Rojestvensky got along splendidly. They ate red-cabbage soup together and the professor O.K.'d the whole project. That made him responsible for anything that went wrong and Aerodynamic Design, en masse, was much relieved. They sent in a preliminary report on their intentions and started to make one gadget

themselves. The Nuclear Fission man was strangely willing to play along and see what happened. He supervised the construction of the thing.

It consisted of a set of straps very much like a parachute harness, hung from a little bar of brass with a plating of metallic sodium, under another plating of nickel, and the whole thing inclosed in a plastic tube. There was a small box with a couple of controls. That was all there was to it.

When it was finished, the Nuclear-Fission man tried it out himself. He climbed into the harness in the Wind Tunnel Building of Aerodynamic Design's plant, said the Russian equivalent of "Here goes nothing!" and flipped over one of the controls. In his shakiness, he pushed it too far. He left the ground, went straight up like a rocket, and cracked his head against the three-story-high ceiling and was knocked cold for two hours. They had to haul him down from the ceiling with an extension ladder, because the gadget he'd made tried insistently to push a hole through the roof to the wide blue yonder.

When he recovered consciousness, practically all of Aerodynamic Design surrounded him, wearing startled expressions. And they stayed around while he found out what the new device would do. Put briefly, it would do practically anything but make fondant. It was a personal flying device, not an airplane, which would lift up to two hundred twenty-

five pounds. It would hover perfectly. It would all by itself, travel in any direction at any speed a man could stand without a windshield.

True, the Rojestvensky Effect which made it fly was limited. No matter how big you made the metal bar, it wouldn't lift more than roughly a hundred kilos, nearly two-hundred-and-fifty pounds. But it worked by the fact that the layer of metallic sodium on the brass pushed violently away from all other sodium more than three meters away from it. Sodium within three meters wasn't affected. And there was sodium everywhere. Sodium chloride—common table salt—is present everywhere on Earth and the waters under the Earth, but it isn't present in the heavens above. So the thing would fly anywhere over land or sea, but it wouldn't go but so high. The top limit for the gadget's flight was about four thousand feet, with a hundred-and-fifty-pound man in the harness. A heavier man couldn't get up so high. And it was infinitely safe. A man could fly night, day, or blind drunk and nothing could happen to him. He couldn't run into a mountain because he'd bounce over it. The thing was marvelous!

Aerodynamic Design made a second triumphant report to the Politbureau. A new and appropriately revolutionary device—it was Russian—had been produced in obedience to orders. Russian science had come through! When better revolutionary discoveries were made, Russia

would make them! And if the device was inherently limited to one-man use—ha-ha! It gave the Russian army flying infantry! It provided the perfect modern technique for revolutionary war! It offered the perfect defense for peaceful, democratic Russia against malevolent capitalistic imperialism! In short, it was hot stuff!

As a matter of fact, it was. Two months later there was a May-Day celebration in Moscow at which the proof of Russia's superlative science was unveiled to the world. Planes flew over Red Square in magnificent massed formations. Tanks and guns rumbled through the streets leading to Lenin's tomb. But the infantry—where was the infantry? Where were the serried ranks of armed men, shaking the earth with their steady tread? Behind the tanks and guns there was only emptiness.

For a while only. There was silence after the guns had gone clanking by. Then a far-distant, tumultuous uproar of cheering. Something new, something strange and marvelous had roused the remotest quarter of the city to enthusiasm. Far, far away, the flying infantry appeared!

Some of the more naïve of the populace believed at first that the U.S.S.R. had made a nonaggression pact with God and that a detachment of angels was parading in compliment to the Soviet Union. It wasn't too implausible, as a first impression. Shoulder to shoulder, rank after rank, holding fast to lines like dog leashes that held them in forma-

tion, no less than twelve thousand Russian infantrymen floated into the Red Square some fifteen feet off the ground. They were a bit ragged as to elevation, and they tended to eddy a bit at street corners, but they swept out of the canyons which were streets at a magnificent twenty-five miles an hour, in such a display of air-borne strength as the world had ever seen before.

The population cheered itself hoarse. The foreign attachés looked inscrutable. The members of the Politbureau looked on and happily began to form in their minds the demands they would make for pacts of peace and friendship—and military bases—with formerly recalcitrant European nations. These pacts of closest friendship were going to be honeys!

That same morning Professor Rojestvensky breakfasted on red-cabbage soup and black bread, wholly unaware that he had remade the world. But that great events were in the making was self-evident even to members of the United States Senate. Newsreel pictures of the flying infantry parade were shown everywhere. And the Communist parties of the western nations were, of course, wholly independent organizations with no connection whatever with Moscow. But they could not restrain their enthusiasm over this evidence of Russian greatness. Cheering sections of Communists attended every showing of the newsreels in every theater and howled themselves hoarse. They took regu-

lar turns at it and were supplied with throat lozenges by ardent Party workers. Later newsreels showing the flying infantry returning to camp over the rooftops of Moscow evoked screams of admiration. When a Russian documentary film appeared in the Western world, skillfully faking the number of men equipped with individual flying units, the national, patriotic Communist party members began to mention brightly that everybody who did not say loudly, at regular intervals, that Russia was the greatest country in the world was having his name written down for future reference.

Inspired news-stories mentioned that the entire Russian army would be air-borne within three months. The magnificent feat of Russian industry in turning out three million flying devices per month brought forth screaming headlines in the *Daily Worker*. There were only two minor discords in the choral anaphony of national-Communist hosannahs and capitalistic alarm.

One was an air-force general's meditative answer to the question: "What defense can there be against an army traveling through the air like a swarm of locusts?" The general said mildly: "Well-I-I, we carried eighteen tons of condensed milk fourteen thousand miles last week, and we've done pretty good work for the Agriculture Department dusting grasshoppers."

The other was the bitter protest made by the Russian ambassador in Washington. He denounced the capi-

talist-economy-inspired prevention of the shipment to Russia of an order for brass rods plated with metallic sodium, then plated with nickel, and afterward inclosed in plastic tubes. State Department investigation showed that while an initial order of twelve thousand five hundred such rods had been shipped in April, there had been a number of fires in the factory since, and it had been closed down until fire-prevention methods could be devised. It was pointed out that metallic sodium is hot stuff. It catches fire when wetted or even out of pure cussedness it is fiercely inflammable.

This was a fact that Aviation Production in Russia had already found out. The head man was in trouble with his own friends in the Politbureau for failing to meet production quotas, and he'd ordered the tricky stuff—the rods had to be dipped in melted sodium in a helium atmosphere for quantity production—manufactured in the benighted and scientifically retarded United States.

There was another item that should be mentioned, too. Within a week after the issue of personal fliers to Russian infantrymen, no less than sixty-four desertions by air to Western nations took place. On the morning after the first night maneuvers of the air-borne force, ninety-two Russians were discovered in the Allied half of Germany alone, trying to swap their gadgets for suits of civilian clothes.

They were obliged, of course. En-

terprising black marketeers joyfully purchased the personal fliers, shipped them to France, to Holland, to Belgium, Sweden, Norway, and Switzerland, and sold them at enormous profits. In a week it was notorious that any Russian deserted from the flying infantry could sell his flight-equipment for enough money to buy forty-nine wrist watches and still stay drunk for six months. It was typical private enterprise. It was unprincipled and unjust. But it got worse.

Private entrepreneurs stole the invention itself. At first the units were reproduced one by one in small shops for high prices. But the fire-hazard was great. Production-line methods were really necessary both for economy and industrial safety reasons. So after a while the Bofors Company, of Sweden, rather apologetically turned out a sport model, in quantity, selling for *kronen* worth twelve dollars and fifty cents in American money. Then the refurbished I. G. Farben put out a German type which sold openly for a sum in occupation marks equal to only nine eighty American. A Belgian model priced—in francs—at five fifty had a wide sale, but was not considered quite equal to the Dutch model at guilders exchanging for six twenty-five or the French model with leather-trimmed straps at seven dollars worth of devaluated francs.

The United States capitalists started late. Two bicycle makers switched their factories to the production of personal fliers, yet by the

middle of June American production was estimated at not over fifty thousand per month. But in July, one hundred eighty were produced and in August the production—expected to be about three hundred thousand—suddenly went sky-high when both General Electric and Westinghouse entered the market. In September American production was over three million and it became evident that manufacturers would have to compete with each other on finish and luxury of design. The days when anything that would fly was salable at three fifty and up were over.

The personal flier became a part of American life, as, of course, it became a part of life everywhere. In the United States the inherent four-thousand-foot ceiling of personal fliers kept regular air traffic from having trouble except near airports, and flier-equipped airport police soon developed techniques for traffic control. A blimp patrol had to be set up off the Atlantic Coast to head back enthusiasts for foreign travel and Gulf Stream fishing, but it worked very well. There were three million, then five million, and by November twelve million personal-flier-equipped Americans aloft. And the total continued to rise. Suburban railways—especially after weather-proof flying garments became really good—joyfully abandoned their short-haul passenger traffic and all the railroads settled down contentedly to their real and profitable business of long-haul heavy-freight carriage. Even the air lines pros-

pered incredibly. The speed-limitation on personal fliers still left the jet-driven plane the only way to travel long distances quickly, and passengers desiring intermediate stops simply stepped out of a plane door when near their desired destination. Rural residential developments sprang up like mushrooms. A marked trend toward country life multiplied, Florida and California became so crowded that everybody got disgusted and went home, and the millennium appeared to be just around the corner.

Then came the dawn. It was actually the dawn of the remade world, but it looked bad for a while. The Soviet government stormed at the conscienceless, degraded theft of its own State secret by decadent and imperialistic outsiders. Actual Russian production of personal fliers was somewhere around twenty-five hundred per month at a time when half the population of Europe and America had proved that flying was cheaper than walking. Sternly, the Soviet Government—through the Cominform—suggested that now was the time for all good Communists to come to the aid of their Party. The Party needed personal fliers. Fast. So enthusiastic Communists all over Europe flew loyally to Russia to contribute to the safety of their ideals, and to prove the international solidarity of the proletariat. They landed by tens of thousands without passports, without ration cards, and often with insufficient

Party credentials. They undoubtedly had spies among them, along with noble comrades. So the U.S.S.R. had to protect itself. Regretfully, Russian officials clapped the new arrivals into jail as they landed, took away their fliers, and sent them back to their national borders in box cars. But they did send indoctrination experts to travel with them and explain that this was hospitable treatment and that they were experiencing the welcome due to heroes.

But borders were not only crossed by friends. Smuggling became a sport. Customs barriers for anything but heavy goods simply ceased to exist. The French national monopoly on tobacco and matches evaporated, and many Frenchmen smoked real tobacco for the first time in their lives. Some of them did not like it. And there were even political consequences of the personal-flier development. In Spain, philosophical anarchists and *syndicalistas* organized political demonstrations. Sometimes hundreds of them flew all night long to rendezvous above the former royal palace in Madrid—now occupied by the Caudillo—and empty chamber-pots upon it at dawn. Totalitarianism in Spain collapsed.

The Russian rulers were made of sterner stuff. True, the Iron Curtain became a figment. Political refugees from Russia returned—sometimes thoughtfully carrying revolvers in case they met somebody they disliked—and disseminated capitalistic propaganda and cast doubts upon



the superiority of the Russian standard of living. Often they had wrist watches and some of them even brought along personal fliers as gifts to personal friends. Obviously, this sort of thing was subversive. The purity of Soviet culture could not be maintained when foreigners could enter Russia at will and call the leaders of the Soviet Union liars. Still less could it survive when they proved it.

So the Soviet Union fought back. The Army set up radars to detect the carriers of anti-dialectic-materialism propaganda. The Ministry of Propaganda worked around the clock. People wearing wrist watches were shot if they could not prove they had stolen them from Germans, and smugglers and young men flying Sovietward to ply Russian girls with bar chocolates were intercepted. For almost a week it seemed that radar and flying infantry might yet save the Soviet way of life.

But then unprincipled capitalists dealt a new foul blow. They advertised that anybody intending to slip through the Iron Curtain should provide himself with Bouffon's Anti-Radar Tin Foil Strips, available in one-kilogram cartons at all corner shops. Tin foil strips had been distributed by Allied bombers to confuse German radar during the last war. Smugglers and romantic young men, meditatively dripping tin foil as they flew through the Russian night, made Russian radar useless.

Nothing was left but war. So a

splendid, overwhelming blow was planned and carried out. In two nights the entire Soviet force of flying infantry was concentrated. On the third night four hundred thousand flying infantry went sweeping westward in an irresistible swarm. The technique had been worked out by the General Staff on orders from the Politbureau to devise immediately a new and unbeatable system of warfare—or else. The horde of flying warriors was to swoop down from the darkness on Western European cities, confiscate all personal fliers and ship them back to Russia for the use of reinforcements. There could be no resistance. Every part of an enemy nation was equally reachable and equally vulnerable. Russian troops could not be bombed, because they would be deliberately intermixed with the native population. There could be no fighting but street-fighting. This would be war on a new scale, invasion from a new dimension, it would be conquest which could not be fought.

The only trouble was that practically every square mile of European sky was inhabited by somebody enjoying the fruits of Russian science in the form of a personal flier. And secrecy simply couldn't be managed. All Europe knew just about as much about the Russian plan as the Russians did.

So when the clouds of flying infantry came pouring through the night, great, droning bombers with riding-lights and landing-lights aglow came roaring out of the west

to meet them. There were, to be sure, Soviet jet-fighters with the defending fleet. They tangled with the Russian escort and fought all over the sky, while the bombers focused their landing-lights on the infantry and roared at them. The sensation of being ahead of a bellowing plane rushing at one was exactly that of being on a railroad track with an express train on the loose. There was nothing to do but duck. The Russian soldiers ducked. Then the bombers began to shoot star shells, rockets, roman candles and other pyrotechnics. The Russian troops dispersed. And an army that is dispersed simply isn't an army. When finally vast numbers of enthusiastic personal-flier addicts came swooping through the night with flashlights and Very pistols, the debacle was complete. The still-fighting planes overhead had nothing left to fight for. Those that were left went home.

When dawn came the Russian soldiers were individuals scattered over three separate nations. And Russian soldiers, in quantity, tend to fight or loot as opportunity offers. But a Russian soldier, as an individual, craves civilian clothes above all else. Russian soldiers landed and tried to make deals for their flying equipment according to the traditions of only a few months before. They were sadly disillusioned. The best bargain most of them could make was simply a promise that they wouldn't be sent back home—and they took that.

It was all rather anticlimactic, and

it got worse. Russia was still legally at war with everybody, even after its flying infantry sat down and made friends. And Russia was still too big to invade. On the other hand, it had to keep its air force in hand to fight off attempts at invasion. Just to maintain that defensive frame of mind, Allied bombers occasionally smashed some Russian airfields, and some railroads, and—probably at the instigation of decadent capitalists—they did blow up the Aviation Production factories, even away off in the Urals. Those Ural raids, by the way, were made by the United States air force, flying over the North Pole to prove that it could deliver something besides condensed milk at long distances.

But the war never really amounted to much. The Allies had all the flying infantry they wanted to use, but they didn't want to use it. The Russians worked frantically, suborning treason and developing black marketeers and so on, to get personal fliers for defense, but Russian civilians would pay more than even the Soviet government for them, so the Army hardly got any at all. To correct this situation the Supreme Soviet declared private possession of a personal flier a capital offense, and shot several hundred citizens to prove it. Among the victims of this purge, by the way, was the Nuclear Fission man who had worked out the personal flier from Professor Rojestvensky's figures. But people

wanted personal fliers. When owning one became a reason for getting shot, almost half the Russian government's minor officials piled out of the nearest window and went somewhere else, and the bigger officials kept their personal fliers where they could grab them at any instant and take off. And the smuggling kept on. Before long practically everybody had private fliers but the army—and flier-equipped soldiers tended to disappear over the horizon if left alone after nightfall.

So the Soviet Union simply fell to pieces. The Supreme Soviet couldn't govern when anybody who disagreed with it could go up the nearest chimney and stay gone. It lost the enthusiastic support of the population as soon as it became unable to shoot the unenthusiastic. And when it was committed to the policy of shooting every Russian citizen who possessed proof of the supreme splendor of Russian science—a personal flier—why public discipline disappeared. Party discipline went with it. All discipline followed. And when there wasn't any discipline there simply wasn't any Soviet Union and therefore there wasn't any war, and everybody might as well stop fooling around and cook dinner. The world, in fact, was remade.

Undoubtedly the world is a good deal happier since Professor Rojstvensky thought of an interesting inference to be drawn from the Bramwell-Weems Equation while at his breakfast of red-cabbage soup

and black bread. There are no longer any iron-bound national boundaries, and therefore no wars or rumors of wars. There are no longer any particular reasons for cities to be crowded, and a reasonably equitable social system has to exist or people will go fishing or down to the South Seas, or somewhere where they won't be bothered.

But in some ways the change has not been as great as one might have expected. About a year after the world was remade, an American engineer thought up a twist on Professor Rojstvensky's figures. He interested the American continental government and they got ready to build a spaceship. The idea was that if a variation of that brass-sodium-nickel bar was curled around a hundred-foot-long tube, and metallic sodium vapor was introduced into one end of the tube, it would be pushed out of the other end with some speed. Calculation proved, indeed, that with all the acceleration possible, the metallic vapor would emerge with a velocity of ninety-eight point seven percent of the speed of light. Using Einstein's formula for the relationship of mass to speed, that meant that the tube would propel a rocket-ship that could go to the Moon or Mars or anywhere else. The American government started to build the ship, and then thought it would be a good idea to have Professor Rojstvensky in on the job as a consultant. Besides, the world owed him something. So he was sent for, and

Congress voted him more money than he had ever heard of before, and he looked over the figures and O.K.'d them. They were all right.

But he was typical of the people whose happiness has not been markedly increased by the remade world. He was a rich man, and he liked America, but after a month or so he didn't look happy. So the government put him in the most luxurious suite in the most luxurious hotel in America, and assigned people to wait on him and a translator to translate for him, and did its very best to honor the man who'd re-

made the world. But still he didn't seem content.

One day a committee of reporters asked him what he wanted. He would be in all the history books, and he had done the world a great favor, and the public would like him to be pleased. But Professor Rojstvensky shook his head sadly.

"It's only," he said gloomily, "that since I am rich and the world is peaceable and everybody is happy—well, I just can't seem to find anyone who knows how to make good red-cabbage soup."

THE END.

IN TIMES TO COME

James H. Schmitz is back in the March issue, with a yarn called "Space Fear"—another of the Vegan Confederation series. It is, incidentally, a beautiful example of why an editor can't judge an author's idea before he sees the finished manuscript. I could give you an outline of the plot on this one, and you'd have no idea at all what the story is like; it isn't the plot, it's the way it's told. You see it's about a telepath and some people who had a phobia about space, and a girl who's eight feet high and . . . uh, well—Look—I tell you; read it and find out, huh?

I also want to warn you we have one coming up by a new author, Henderson Starke, that is actually a fantasy. We don't publish fantasy in this magazine ordinarily, but any time we get so hidebound we turn down a really neat idea because it happens to be fantasy instead of science-fiction we'd better quit. This one is called "Casting Office," and it's a nice, nasty idea to mull over. While we're principally interested in science fiction, it's the free-roaming idea that really intrigues. This has that.

THE EDITOR.

ASSIGNMENT IN THE UNKNOWN

BY FRANK QUATTROCCHI

It was a sort of chess all right — but chess in which the moves were fixed by rolling dice. And one of the dice was loaded — and another one was hollow. And together . . .

Illustrated by Orban

John Baker's long, lank body sank deep into the puttylike substance of the control cavity, his face livid from the pressure of acceleration. It did not take the insistent rasp of the robot warning device to tell him that neither he nor the pitiful little patrol craft could withstand many such maneuvers. And, of course, it was not enough.

The end game. Three-dimensional chess in outer space.

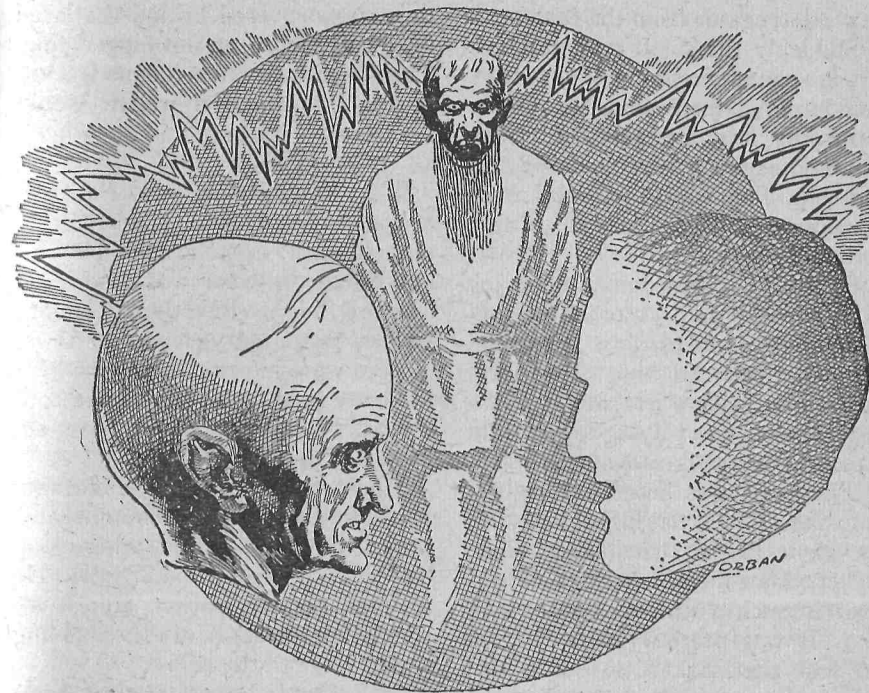
Baker's mind caught up the analogy and knew it to be accurate. The faint odor of ozone rising from the burned-out force projector told him. So did the constant two-hundred twenty-cycle audio bleap of the Ion detector. An interrogator beam had

come from somewhere out there to fix the patrol craft's position. The deadly swarm of Omegon particles, which had come down that beam a second and a half after the contact, had missed, thanks to Baker's frantic maneuver, but not by much.

He was in check.

If the analogy held up, Baker would have thirty seconds or so. That much grace came from the time it would take the other craft's automatic azimuth prediction controls to operate, the reaction time of its operator, and the time it took for the deadly beam itself. How many turns remained? Five, six, seven? It depended upon the skill—perhaps the will—of his opponent.

ASTOUNDING SCIENCE-FICTION



Baker's reddened eyes peered into the glowing videoglobe. The tiny bright dot representing the patrol craft seemed almost to wallow along its slow path. Had he dared use the craft's feeble interrogator beam he might have been able to pinpoint the two-pronged space force that opposed him. But there was little need. Baker was reasonably sure the force was brazenly bearing down on him along a straight course.

That, of course, was itself a confirmation of the situation. Baker's one remaining Omegon projector could rather easily exact a trade with

the force. A lucky burst might pick off a Heavy. But even more certainly a Repeater aboard another Heavy would blast his tiny craft to atoms. And a trade would be fatal even if it only burned out his projector.

Baker took his turn just as the thirty seconds ran out. Four Gs again forced him back into the control cavity and pinned his right arm to the instrument panel. The dot in the videoglobe arched a short distance and then assumed a straight path. It was not a good position, but perhaps it was sufficient to require a

ASSIGNMENT IN THE UNKNOWN

new interrogator from the force.

Suddenly the small craft lurched. An ion counter sprang into action, first buzzing, then humming, finally screaming its message. The fringe of an Omegon swarm had touched the ship. The deadly particles were glancing obliquely off the ship's thin force screen.

Close! They had done a good job of anticipating him. Another few seconds of arch and that swarm would have disintegrated him. They were most likely using a Probability Computer. Baker was playing too straight a game of three-dimensional chess!

The game was becoming vaguely amusing. The utter hopelessness of the game had its usual effect upon Baker. Some mental mechanism took over in such a time and turned off fear. It was precisely when he felt no fear that Baker was sure that there was no way out.

Somewhere in the ship a robot detector circuit closed, activating a bell.

Are they that close? The range of the robot instrument was perhaps five kilometers. Baker flipped a switch and watched the angry image of a space cruiser flash on a video screen. Instinctively his hand dropped to the Omegon firing lever. It would be a cinch—

No. Another simple trade offer. He was assured of dispatching the Cruiser, but saving his projector was another matter. No, Baker could accept no trade and must, in fact, be caught in the position of having to make one.

Quickly swinging the craft around,

Baker maneuvered behind the large fin-jet assembly of the bigger ship. Then he discharged a 400mm tracker rocket, knowing full well it would never reach its target.

“. . . congratulate you, Baker—” a voice suddenly said. Baker quickly pinpointed it. Somehow his burned-out Force projector was resonating a strong, highly directional communicator beam. Very clever.

“We were informed that you were far more impetuous,” the voice continued. “I, Onyo, might have accepted such a trade.”

Baker's mind raced. The mocking voice inflamed him. Communicator beam—could he send a tracker along it? Well, suppose it didn't work. He released another rocket, almost instantly felt the shock of the exploding rocket close to the ship.

“Oh come, Baker. Is that your only form of reply? Speak. I can hear you perfectly. I repeat, my congratulations. Our little game has become most interesting to me. Of course, you are quite without hope. But it has been a game battle. I was not at all prepared to lose that Heavy earlier in our contest.”

Baker sought ways of stopping the voice of his enemy. But then the voice could not harm him and he might learn something from it.

“Pretty good, huh?” Baker said. Perhaps he could establish a tracker beam on a slightly different frequency—one that did not carry a detonator pattern. But again common sense told him it was impossible.

“Incidentally, Baker, your first rocket has become a rather pretty little moon of our earth. As for your second—you felt its effect upon *us*, didn't you?”

Wham! A shock burst rattled the patrol craft like a kicked tin can. Baker almost cried out the pain in his ears.

“That could very well have melted your craft, my friend,” said the voice of Onyo. “However, I have determined to take you alive.”

What a fool he had been. Busy shooting off sky rockets while he should have been planning an evasion pattern. Now he had to retaliate!

The cruiser! Baker watched the ship stealthily maneuver to bring him under its aft waist guns. Depending upon his being diverted by the boss, eh?

The battered patrol ship shrieked its inanimate protest as twenty Gs forced it into a collision course with the cruiser. Again the warning bell sprang into action. Baker pulled away at the last instant. There was a sickening lurch as the lowered launching mechanism of the craft sheared away the cruiser's starboard auxiliary jet.

But there was no time for rejoicing. Instantly the craft was shaken by a battery of shock beams. The glancing force of a shock beam caught the ship high amidships causing it to toss end over end through space. The control cabin lights blinked, then went out plunging Baker into utter darkness. A flying piece of metal from some broken

instruments struck him in the forehead.

It was moments before the craft's deadhand robots re-established some kind of stability. Gradually the control cabin lights regained some fraction of their brilliance. Baker was dazed. He tasted the faintly salt flavor of blood.

“Very good, Baker. My cruiser commander was caught in his own little trap of diverted attention. I am not at all certain, however, that your little move was advisable. Particularly in view of the condition of your craft. But it was a rather valiant attempt. You would undoubtedly play an interesting game of chess!”

Baker wiped the blood from his face and switched on the robot damage control net. Slowly a grim decision was forming in his mind.

“Launching mechanism, useless,” began the emotionless metallic robot voice. “Starboard fin assembly and auxiliary jets operatable at forty percent efficiency. Fuel tank pierced, but repairable. Estimated fuel loss, eight hundred thousand mass-ratio units. Rate of loss diminishing to two hundred mass-ratio units.”

Baker switched it off. His vocal opponent was right. He had simply made an ill-advised trade.

“But tell me, Baker,” continued the voice. “Won't you consider resigning? An end game against hopeless odds is, after all, a rather trying effort.”

Resign? That meant allowing himself to be taken alive. Taken by the

totalitarians. Taken by the enemies of every instant of his thirty-three years of life. Taken by the forces he had opposed during a lifetime of the most fantastically intensive training, conditioning, preparation. Taken by the enemies of Morgan, Lebussier, Tryndall—the long list of martyrs in the fight for freedom, democracy, human dignity. The long list of almost legendary soldiers of freedom—the Liberation committee.

For Earth in the Thirtieth Century had spawned the stable totalitarian system-state. Springing from roots far far back in the dim reaches of man's history, it had matured now, avoiding the contradictions of the early Fascist and Communist regimes, hurdling and finally dissolving national boundaries into a single weld—the Unity party.

Unity. That twisted and tortured word! The greatest assemblage of human control power that man had ever seen, a power that controlled not only the economy and sociology but also the psychology of the swarming billions of its victims! Controlled the Earth's entire surface, controlled the extensive Luna settlement, the tenuous Martian outposts and the Venusian one. Unity!

Resign? Baker again recalled the quiet, grave faces, the burning eyes of the men and women of the Liberation committee. He recalled the fantastic courage of that tiny group of dedicated human beings. They seemed to speak to him now as he forced the tiny craft through its chess game in space. The voice was that

of Henri, the man who had rescued him from the bloody streets of his city after the last Great Purge twenty-six years ago.

"Here is your assignment, John. You know what it means to Liberation that these assignments are carried out—to the letter. There is little to say about it except that, regardless of what you think of it, it represents a step toward our goal.

"And one thing more: I believe you are the only man alive who has a chance of making it succeed!"

Resign?

A robot voice spoke: "Warning! The course you have chosen conflicts with the best analysis of the available data."

Yes, he knew.

"You didn't answer me, Baker," the voice of Onyo said quietly.

"You want me to resign so I can lead you to the Liberation committee?" Baker asked his enemy ironically.

"But you are unable to do that, Baker," answered Onyo. "You have never known where the committee's underground headquarters is. So what have you to lose by saving your life?"

His soul!

"Warning!" said the impassive robot voice once more. "Your present course is inimical to the best welfare of yourself and this ship, according to the best—"

"Sure!" Baker shouted at the instrument.

"Even your ship's robot advises your resignation," the voice of the

force projector mocked.

"Warning. You have been warned that the course you have chosen is not permitted under Section 102.8 of the agent's code—"

Agent's code! Words now. Words only. How could the committee have prepared a code to fit his present dilemma? Besides, this patrol ship was not Baker's. He had managed to steal the captured ship in his escape from the city. He convinced himself that his own ship would not try to enforce the Agent's code—not now.

"... Section 102.8 of the—"

Didn't they tell him that he, as a special committee agent, represented the forward hope of Liberation? Not through any inherent value he possessed as a human being, but as a carefully prepared and conditioned soldier of Liberation? Didn't they warn him that his capture alive—"

"... you are urged to turn from your present course—"

"Hear that, Baker?" asked the voice of Onyo.

"Come and get me, Onyo!" Baker shouted.

"We can destroy you in the midst of your course, Baker."

"Fire away, Onyo!" Baker shouted. "I remember you now. You're quite a big shot in the Party, aren't you?"

"A tribute to you, my friend," Onyo said.

"Then win another decoration—fire away, Onyo!"

"Perhaps we shall simply pluck your little ship from its course with our very excellent force beams."

That Onyo could not do. Not without plucking a still-potent beam of Omegon particles. Nor could they be warded off either. Not with a force beam carrier!

"Warning, pilot," said the robot speaker. "You are falling under full power toward a dense body. Under Section 102.8 of the agent's code—"

Baker flung a drinking flask at the speaker box. Glass and liquid splashed over its surface, adhered briefly, then formed free globules.

"The ship's robot is obliged to overpower you, Baker. Your little plan simply won't work."

"Not if I overpower the robot first!" Baker shouted.

There was a good chance of carrying out his threat. He had helped assemble similar patrol ships in the Liberation committee's underground laboratories. The robot circuits were secret, even from pilot-agents, but they could be found.

"Warning! Your course is inimical to the best welfare of yourself and your ship," announced the robot as before. "You are warned that should you disregard this warning the robot control will be forced to make an arbitrary decision—"

"Think, Baker," urged the voice from the burned-out force projector. "You have nothing to lose from your . . . resignation. Your value to us would certainly guarantee your survival."

Survival. What did it actually mean in a context like this?

"Warning! Your ship's robot will

make an arbitrary choice of course pattern if you do not—”

Too bad they couldn't have built a system of logical alternatives into the robots. What were his alternatives?

“You feel it is your duty. Duty is a matter of chemistry, Baker. Will you lose your life for it? Come. I'll see to it you are given a test tube of it!”

You are cautioned that the time will come when to carry out the letter of your assignment will seem contrary to the dictates of logic. But discretion is not given to agents of the Liberation committee—

The brilliant flame of the torch slowly made its way through the hard metal paneling. Logic indicated that the main power line of the robot had to be beneath it.

“Warning! Thirty seconds remain for you to alter your present unpermitted course—without robot assistance.”

A bit of irony on the sound tract!

The last inch of a ragged rectangle of hot metal was cut through. Baker burned his hand removing it. A thick cable of colored wires was visible through the hole. Now—twenty-odd seconds to find the right one—”

“Warning! Twenty-five seconds—”

What was it Henri had said? “It isn't always possible to give you the context when we give you the order. I wish it were possible—or feasible—to tell you more.”

The assignment had been a disappointment. It was almost ordinary,

routine. Not without risks certainly, but—

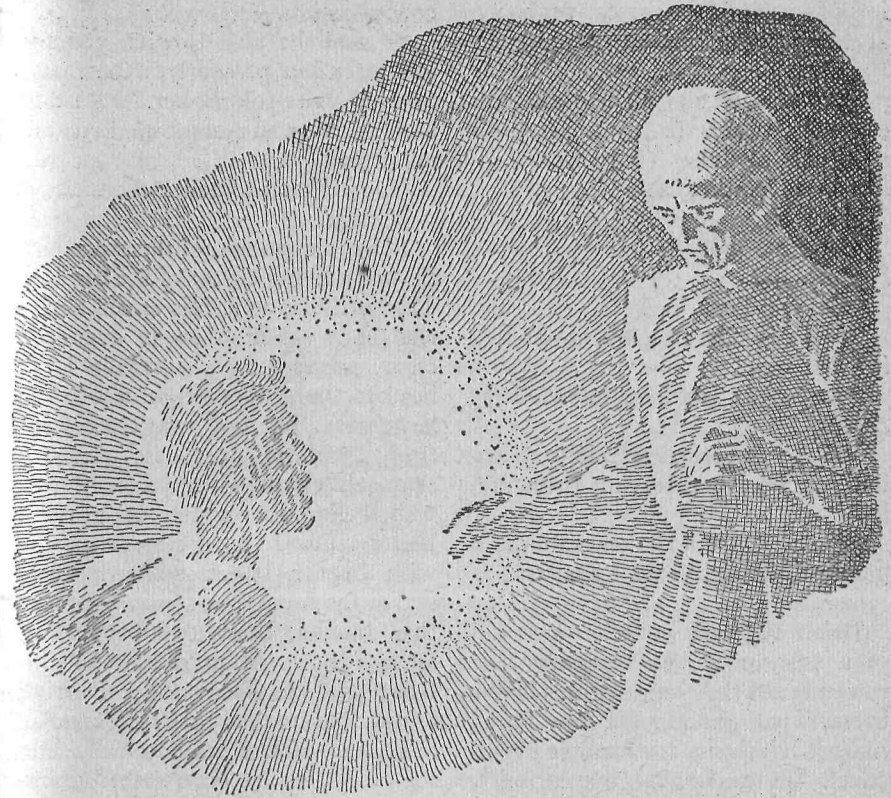
Baker remembered his uneventful entrance into the city. He had been surprised that it involved no more than a simple disguise and a forged magnidentification card. Somehow he had expected more elaborate preparations.

Nevertheless, it had all gone off with incredible smoothness. He had quickly been able to fit into the college crowd of Monori. Just as his orders specified he had spent a full year in the Monori Laboratory of Advanced Politicophysics. He was ostensibly doing postgraduate work.

After that there had come the anticipated offer of a State lab job. He had spent the next six months fitting himself into the life of a State scientist. There had been Unity party meetings—he had quickly become a petty functionary—and growing prestige with the totalitarians.

Then, completely without warning, the entire structure had fallen like a house of cards. As with such things since time out of memory, it had happened in the dead of night. Three security police with an order for the arrest of Liberation Agent John Baker, LCA 0690865. Just like that.

Somewhere there had been a mistake. Perhaps the apparent ease of the assignment had lulled him. But search his memory as he would he could find nothing. He had been completely out of contact with Liberation. He had made no attempt to convert anyone—indeed, had delivered long and well prepared speeches



against various tenets of Liberation.

“Fifteen seconds—”

Well, he had escaped. It had been nothing short of a miracle. Nothing like it would happen again in a million years. A fluke. One of the security police had tripped awkwardly. Baker had grabbed a blaster—bright blue flashes in the darkness—the certainty he would be captured—the pursuit through the rubble of the Old City. Then, by the merest of accidents, he had fallen into—not dis-

covered—an ancient sewer line!

“Ten seconds—”

Baker wiped blinding beads of sweat from his eyes and worked his sensitive fingers through the maze of cables. He had nearly eliminated the bundle.

And how fantastically lucky he had been in finding this ship. It was against all believing. Poor Dave! He had been captured a week or so before, his ship had been brought back to Monori—to be placed in a museum

for propaganda purposes, probably. It had simply invited capture by Baker.

All in all it was evident that his escape had been the most extraordinary sort of fluke. There was absolutely no logic to it.

No logic!

"Five seconds—"

No logic!

"Baker! Turn back!"

No logic! The assignment—no logic? But wait!

Suppose he had been intended for capture!

Baker's fingers slowly left the robot control lines, leaving them still intact.

"O.K., Onyo," Baker said in a genuinely dazed voice. "You win."

Baker regained consciousness out of a vast, unbroken blackness. He remembered the Neuron gun's bluish beam. That was all. He now found himself lying on a comfortable plastic couch. He was in a large luxuriously furnished study of a rather anachronistic tone. Books—of very limited use in this century of three-dimensional audio-video screens—lined the wall from floor to high ceiling. A large fireplace, long a thing of the nearly forgotten past, formed the only break in the walls of books.

At the other end of the study Baker saw a large, somewhat overly ornate desk. Behind it sat a man probably in his late sixties. He was apparently unaware that Baker had regained consciousness, for he was reading a thick manuscript in deep

concentration.

"I shall be able to give you my full attention presently," the man's familiar voice told Baker. "Please be at your ease and rest assured you are unharmed."

"Onyo!" exclaimed Baker.

"Quite."

Baker's opponent of the space battle was a living cipher of the cerebral Thirtieth Century. His small, shriveled body sat high on an oversized chair, pushing an abnormally large head to the proper height above the large desk. The head was almost entirely without hair, its features strangely crammed into a small area well below its center of gravity. Baker studied the grotesque profile with disgust. It was somewhat less and at the same time somewhat more than human. Some evil product of an age that worshiped only the intellect and despised as decadent all moral, spiritual or aesthetic worth.

Baker reached automatically into his jacket for his cigarettes. Becoming aware of the act he was amazed to find all of his personal belongings present except, of course, his blaster.

"There is an ash tray on the small table to the left of your couch," Onyo informed him. Then, looking at Baker for the first time, he inquired: "Why did you give up piano, if I may ask?"

Piano? Baker had almost forgotten it. He had discontinued his lessons a year or so before the Great Purge. Even then the possession of a piano—or a work of art, a religious object of any sort—had been

deemed subversive. He had been six years old. Yet he remembered vividly the tears of his mother, the grim line of his father's mouth. Confiscation.

"Ah, yes, I remember," mused Onyo. "Unfortunate necessity. I am quite fond of the piano myself. Unfortunate. A man of action and intellect could well have balanced out his life with more of the artistic or, shall I say, feminine."

Men were destroyed for putting forth even remotely similar ideas to this, Baker thought. *The old man must indeed be a big shot!*

Onyo leafed through the remaining few pages of the manuscript, then placed it carefully on his desk. He arose from the huge chair gracefully and without any trace of his apparent age. He was perhaps five feet one inch tall.

"There, I am free to give you my undivided attention. Yes, I am Onyo, the man with whom you played your little game of outer space. Such games occasionally amuse me. My somewhat less than ideally active life requires it."

He slowly approached Baker smiling gently. It was nevertheless a grotesque caricature of a smile.

"You find it odd that in addition to being your . . . contestant I am also your . . . host?"

Baker did not reply. Obviously there was a good reason why he found himself alone with this misshapen ghost of a man. His hand still held the heavy metallic ash tray.

"You are a most reticent man, Baker. It befits a man of action."

Onyo turned before, reaching Baker and stepped to the bookshelf. He extracted a volume and seemed to be instantly engrossed in his pages.

"A pleasant study, is it not? The books, the fireplace—idiosyncrasy of mine. They give me a link with the past. A past which is not without value to the trained intellect."

For an instant the old man faced away from Baker. Instantly Baker cocked his arm—

"Drop it, Baker," Onyo commanded without emotion.

Baker found it impossible to resist the words. His arm felt heavy as lead. It ached from even a momentary resistance. The ash tray slipped from his grasp.

"For want of a fuller explanation, call it suggestion," Onyo smiled mirthlessly. "I use it as a demonstration. You will soon know the full extent of my power of command over you. But for the present it is enough to show you the utter futility of any contest of physical strength. Meanwhile, by my sufferance, you have complete control of your body and mind."

Baker said nothing. The older man walked the length of the study and began poking at the fireplace. Baker silently watched the expert thrusts of the man as he picked at the glowing log.

"You are an interesting man, Baker," Onyo said without turning. "Far more complex than the average scum our nets brings in these days. But then two hundred years of rat-

like existence predictably will sharpen the wits of any group, eh Baker?"

Baker controlled a stab of hate the words of Onyo excited within him. Outwardly he continued impassively examining the furnishings of the study. He suppressed a faint surge of hope that came to him as he caught sight of an ancient projectile weapon mounted above the door. There was no use. There was no doubting Onyo's complete control of the situation. The ash tray incident had convinced him of that.

"I shall not hide my disappointment in you, however, for abandoning your suicide plan," Onyo continued. "It was a good plan, Baker. We could not have prevented your plunge into Luna. You knew that you could instantly destroy any ship that tried to hold you in a force beam."

"Sure," Baker said. Some reply had been expected of him.

"Or perhaps I should not be disappointed. Perhaps there is another possible interpretation of the action."

"I wanted to stay alive," Baker interjected.

"Perhaps. Perhaps not. We shall soon see." Onyo recrossed the study, walked to his desk, and picked up the manuscript.

"It is obvious to you that you were . . . interrogated?"

"Yeah."

"This is a transcript report. I shall listen to the recordings in detail later. But I find the scrapings of your mind, even in outline, quite fascinating. Would you like to know

what you know of Liberation, Baker? It is usually interesting to captured agents—all of whom are foresworn to absolute secrecy."

"Listen, Onyo," Baker snapped. "Let's get this cat and mouse thing over with. I know you and your boys are clever—"

Onyo smiled. "Time enough for the next phase, Baker. Believe me, there is time enough.

"But unfortunately," Onyo continued, "our 'boys' are not quite so clever as they might think. Not that you were able to evade our questions. Nobody ever is able—or even willing—to escape telling us all we ask or even of volunteering information. You, as all the others before you, were completely co-operative."

"Then what do you want now?" Baker asked.

"Let us put it this way: I require your *help*. I need a bit of your creativity, your intuition."

"What the devil are you getting at, Onyo?"

"Baker, we were able to pump the last scrap of information from you. But there remains a bit of an enigma," Onyo moved closer, his eyes aflame. "I am in the position of insisting that you tell us *something you yourself do not know!*"

The grotesque face of Onyo moved to within inches of Baker.

"Let us drop our masks, Baker. I wish to know—insist upon knowing—why you are here and why you were sent to Monori."

"Read the manuscript—"

"Not enough!" Onyo's bulging,

hate-filled eyes bore deeper into Baker. His eyes seemed to carry some unspoken and irresistible command.

" . . . the Mental Bank in Monori—"

"Try again, Baker. Search your mind for evidence—"

The room grew dim, far away. The voice of Onyo became hollow. It seemed to come to him from far-off space, then from within him, then again from the gaunt, tight face of the man. Baker found himself flattened on the thick synthetic woollen rug of the study. Onyo was bending over him. His head ached. Every muscle of his body ached.

"Get up. We shall try again presently," Onyo commanded.

Baker rose painfully. It had been like a gigantic electrical shock. He felt that every nerve had somehow been frayed by the horrible power of the other man.

Onyo's voice was again cool and precise. "I will give you additional data with which to work. Your assignment orders provided that once you had gained entrance to the Mental Banks you were to contact one of three persons for explicit instructions.

"Dorkus, Hoenic, Miller. You did not know how you would contact them. But you were promised there would be a way. Meanwhile, any change of assignment would come in the form of an innocuous videogram that a certain book was available in the *Mesa* bookstore. You were to go there and receive the new instruc-

tions.

"Finally, at the proper time you were to return to the Liberation committee by means of a robot controlled jet concealed in the rubble exactly five kilometers northeast of Glenopoli."

There seemed no use in denying the complete accuracy of Onyo's information. Baker did not attempt to hide his surprise.

"Baker," the old man began again, "there is theoretically no way whatever for you to hide anything from us. Absolutely no way. Therefore I know that what I am about to tell you will be as much a surprise to you as it was to me.

"There is no record of any Dorkus, Hoenic, or Miller in our most complete files. There is no Mesa bookstore in the known universe. There is no concealed patrol jet in the rubble near Glenopoli."

The first rudimentary sense impressions brought only intense pain to Baker's prone body. Pain and an animal instinct to avoid intense light urged him to attempt to crawl. But he could not. From some long distance away came the voice of Onyo.

"You now see some of the practical applications of my readings in ancient works, Baker."

An enormous effort brought Baker to one knee. There was a taste of blood in his mouth. He vaguely sensed that he was covered with filth.

"You may be interested to know that this process was once known as

the 'third degree.' Archaic in our age save, so far as I know, only in your case, Baker. Do you not feel flattered?

"We can break down every thought you ever had and tap non-analytical recordings that you yourself could never do. But unfortunately the present objective is beyond mere science. It lies in the realm of art, the ancient arts of torture. The days of the SS and the GPU to be exact."

"Wha . . . what can I do?" Baker asked through broken lips.

"Tell us why you are here. Create, Baker. Use your intellect creatively. I shall assist you by ruling out what we know to be false. You were not sent to Glenopoli to work your way into the Mental Bank. Why were you sent?"

Baker went down. A throb of pain from a hundred external causes broke down a thin frontier of consciousness. He did not know how long it was before the first faint point of light broke in the universe of blackness. It grew bigger. Then there was the pain.

"You are incapable of the feat now. But there will be time. You will have an eternity of time when you are finished here. Clean, pure *white* time. I command you to use it, Baker. And remember, should you attempt to avoid your task, the brute savagery of the SS and the refined science of Unity will break you, Baker."

Enough hate and irrational hope,

enough memories and new thoughts, enough speculations and attempts at mental escape—enough of these occupying tasks of mind existed in Baker's brain to last a month of it. Then came the first tentaclelike patches of illusion. Illusion caught at Baker's mind and attempted to hold it from returning to reality.

It was the logical extension of every form of mental torture ever devised by man. Baker found himself immersed in an absolute white. At first he theorized that he lay somehow within a pure white metal sphere completely without seam, rivet, or blemish of any kind. For he could see absolutely nothing but pure white.

But later he became convinced that Onyo had somehow tapped his optic nerve, feeding into it a steady flow of energy that registered as pure white light in his brain. For Baker could see not even his own nose, could not close out the whiteness, could see no part of his body.

Meanwhile his ears carried to him no sound, and his brain registered no other sense perception. Only the shadowless purity of the white. How his physical needs were met he had no idea. He might, for all he knew, have no body, but only a disassociated mind.

How long Baker was alone with only his mind and the fevered products of it he had not the faintest indication. Perhaps it was two months after the first realization of the whiteness that the face of Onyo appeared to him again. The first breach

of the whiteness and the first entry of sound upon his senses was incredibly painful. But Baker would never know a more joyous pain.

"Are you sane, Baker?"

"Onyo!" Baker heard himself say. He could speak!

The thin form of Onyo emerged from the white. Very gradually. Baker could see other things, the room, finally his own body. He was incredibly thin and emaciated. But not even the aspect of bones forcing their way through taut flesh repulsed him now.

"I was hoping your experience would make you a bit more communicative," Onyo smiled.

"How long . . . how long was I—that way?" Baker asked.

"Ah, a time question. Remarkable how invariably the factor of time is the first question. But what does it matter, Baker. A week, a month, a year, ten years—the important thing is that it is ended. You will help me now, won't you?"

"Yes." How completely true the answer would be Baker did not know. He was fairly certain he could not stand a return to the white. "Yes, I'll do as you say, Onyo."

"I thought so. No man can stand nothingness. You were quite resistant, my friend. Your conditioning was superb. You have no idea how many of your fellow agents became quite insane—and therefore useless to me—after far less of it than you had."

They were in a well equipped laboratory. He and Onyo were, as

always before, alone. Baker found himself seated in a complex chair somewhat resembling those in the Psychoconditioning lab at Liberation committee headquarters. So it had been completely a laboratory trick!

The greatest bulk of equipment in the laboratory was obviously devoted to one or another interrogation task. Brain-wave helmets of the type that were becoming almost characteristic of doctor's offices in the Thirtieth Century were scattered about the room. Banks of metaltape recorders and self-recording video screens occupied one end of the lab. Baker had not been prepared to find so many such mentalphysics setups outside the Mental Bank.

"Perhaps one day you will assist me here in this laboratory, Baker. Your record at the Politicophysics school makes me have a high regard for the training you must have received."

"Afraid I'm not up on this level, Onyo," Baker said.

"Oh this, this is nothing, Baker. Mere toys. Useful, but the merest of toys. You should wish to see my private laboratory. You never shall, but it is infinitely above this."

"What about these?" Baker asked displaying electrode-torn wrists. The state of his physical condition was slowly penetrating the horror that still lingered in his mind.

"Try to walk," Onyo said. "It will be necessary to revive you somewhat before you will be in a position to use your new-found cooperativeness."

With great effort and pain Baker maintained his balance. Onyo led him through a door into what appeared to be a kind of clinic. There were two rows of modern hospital beds, obviously lying in wait for the victims of Onyo's lab. A fully equipped medical cabinet and racks of equipment occupied one end of the long room.

As they approached a bed a tall, gaunt white-uniformed man approached.

"Goyone, this is Baker. Repair him. He is one of you now."

The attendant, a man of perhaps seventy, bowed silently a hank of gray hair falling over a high but deeply lined forehead.

"Baker, this is *Dr. Goyone*. Do you recognize the name?"

Baker studied the weathered face. Once it might have been distinguished looking. But that would have been before years and God only knew what had dulled the gray eyes and withdrawn all color. The head rested slightly bent forward on once broad shoulders that now stooped listlessly.

"No, I don't know him," Baker answered.

"No, I suppose not. Not unless you had read very carefully some of the less savory passages of your Liberation committee's tenuous history.

"Dr. Goyone here was once a fairly important physician in an earlier Liberation committee. I believe he once saved Lebusier from a near fatal blast burn. He was one

of my first subjects—a not very successful one, I'm afraid. I returned him to the committee ill-prepared to carry out my orders. He was very nearly killed by one of their guards. Liberation patched him up, however, and he found his way back to me.

"He came back crawling, begging . . . didn't you, Goyone?"

The direct question seemed to cause the old wreck a good deal of agitation. He slobbered a bit as he replied. "Yes, master Onyo, I crawled back, begging."

"He is of limited use to me now," Onyo continued. "But he is quite undeniably faithful. Aren't you, Goyone?"

Before the old physician could reply Onyo struck him sharply across the mouth. He went down heavily on the plastimetal floor. Rising slowly to his feet he wiped away a line of dark blood.

"I am faithful, master Onyo," he said in his toneless voice. Then, almost as a dog would, Goyone extended his hand toward Onyo. "I am faithful, master Onyo. Don't send me back—"

Onyo swept him away with disgust. "Don't plead, Goyone. There is no Liberation committee."

"There is no Liberation committee," repeated the old man.

"Down, Goyone!" Onyo commanded. The old man quickly fell to his knees, his head bowed. Onyo then gave him a savage kick on his bony shin. Goyone groaned a bit but immediately raised his head displaying an idiotic smile.

"Such subservience might be interesting, but unfortunately it is destructive of the man's creative usefulness, Baker. That was a very important early discovery of mine. A discovery, I might add, that accounts for your relatively great amount of self-will."

Baker's head reeled at the unaccustomed effort of standing. Feeling a growing nausea he extended his hand to catch a hold on the bed.

"Cure him, Goyone," Onyo said to the old man. "Call me when he is presentable."

Baker lost consciousness as the old man adjusted the electrodes under his back.

Terrible feelings of utter frustration filled the first days of Baker's scientifically speeded convalescence. Levels of the man's mind dueled for supremacy. Sickened by the knowledge of his inability to resist the twisted will of Onyo, Baker spent long periods in intense self disgust. Then periods during which his analytical mind temporarily gained control followed and he would realize that no amount of cleverness or bravery could have protected him from the evil science of Onyo.

He needed a plan for escape, no matter how farfetched or irrational ultimately. His mind fought the paralyzing horror of the White torture—the inevitable result of failure. By degrees, however, rationality gained dominance over wounded instinct. Gradually ideas of progressively greater subtlety came to him.

There was first the scalpel. Baker's eyes would follow with fascination the still-deft motions of Goyone's hand as the old man wielded the shining instrument. The old man seemed never to notice Baker. Perhaps a sudden snatch—

But the plan was rejected quickly. Strong and sharp as it undoubtedly was, the scalpel would never reach the flesh of Onyo. The mind that had warded off the heavy ash tray could as easily halt the scalpel.

Likewise the equipment of the laboratory clinic offered him no chance of reaching his enemy. The fact that a single word from the mad scientist could halt his muscles instantly vetoed any use of the clinic's mild power.

Then the old doctor became the object of a more subtle plan. He undoubtedly had information, perhaps instruments, that could help.

"Your name is Goyone?" Baker began.

"Goyone," the old man repeated without glancing up from his work.

"Dr. Goyone," Baker continued. But the old man began one of his periods of musings to himself and seemed not to hear.

"You were a great physician—with Liberation," Baker said in a matter-of-fact tone.

The effect was immediate. The old man seemed to convulse. The gleaming scalpel shook in his thin old hands.

"I crawled back, begging—" he muttered, his voice trembling with terror. There was the full-eyed gleam



of a hunted animal in the old face.

It was no use. Baker tried a few more times half-heartedly to contact some fragment of the old man's former self. But the scarred area seemed too large, the fear too great. The old physician could not tolerate any mention of the time before he was brought to Onyo's laboratory. He had in effect been born at the age of fifty-odd here among the fiendish machines of Onyo's laboratory. Any challenge of the scientist's power was to release a dangerous throb of fear which might easily destroy the two of them.

In the end Baker realized that his present situation would serve as a springboard for no plan of escape. So long as Onyo held his absolute power, so long as Onyo lived—that long would he remain a helpless captive. And yet escape he must. For the week in the clinic had brought him a new awareness. It was that his assignment into the unknown—must be—utterly valuable to Liberation. Somehow whatever it was precisely was a key to the struggle for Liberation itself!

"Greetings, my friend," said the sudden voice of Onyo. "Dr. Goyone brings me news of your splendid recovery."

"Hello, Onyo. When can I get out of this?"

"I take that to be impatience to get started on your task."

"That's true," Baker said.

"We have impatience in common then."

"Yeah, let's get it over with, Onyo. You're at the controls, there isn't a single thing I can do to stop you." Baker wondered how close to the truth his placating words were.

"While I don't entirely appreciate the spirit behind 'let's get it over with' I realize that you cannot be expected to betray a secret of such obvious importance easily.

"Perhaps a bit more of the White would have made you more enthusiastic—but I think it would not help. You will be somewhat more efficient without that."

"Zombies aren't very efficient then?" Baker asked.

"No—however you quickly found them not unfaithful," Onyo said casting an amused glance at the back of Goyone. "Our zombie doctor here, for example. You found him an able attendant, but no more, did you not?"

"Yeah, you fixed him up good, Onyo."

"I was glad that you tried to make him an accomplice, however, for that indicates again that you have enough self-initiative left to perform well. But should it happen again—" began Onyo.

It was time for Baker to begin setting in operation a plan which was only partly unfolded to him as yet.

"Onyo, I'm licked. There isn't any way out for me. So let me in on this thing. Don't keep threatening me with torture. Let me put some of my Liberation committee training to work—for you!"

"Hm-m-m, quite a change of

heart," Onyo said. "There is the possibility that you are sincere, or that my little game went a bit beyond what I intended. Or perhaps you are developing a little plan—"

"No, Onyo, I couldn't stand—"

"Enough! I want no servile mutterings from you. We shall see which interpretation is correct later. Meanwhile, I require you to pit your intelligence against the problem at hand."

Baker spent the final week of his convalescence in uninterrupted grueling labor. He explored the two years since being given his assignment with the prodigious tenacity of a microchemist exploring the intricate structure of a protein molecule. He spent hours examining his mental time track. He developed the ability to reproduce long scenes in incredible detail. He explored and probed, selected and discarded.

He sought a pattern to the seemingly irrational two years of his life. He sifted and weighed and gained a little ground. He narrowed his search, being fantastically careful not to discard a scrap of meaningful information. He hypothesized and discarded hypotheses. He correlated facts and developed criteria for weighing them. He failed many times utterly, but when he reached the pinnacle of success, he found it a very small and tentative success.

On the last day of his stay in the clinic Baker summoned the courage to apply a dangerous test.

"It's *Dorkus*, isn't it, Goyone?"

The old man dropped a syringe he was filling and whirled on Baker. A wild gleam flared in the tired eyes of the old man. His mouth trembled.

Instantly Baker supplied the antidote: "It's *dark as* night outside at this hour, isn't it Goyone?"

Goyone relaxed. "It is *dark as* . . . you say outside." The old physician stooped to pick up the broken syringe.

It was a small thing. But it was enough.

"Need I assure you," Onyo was saying, "that there is no way for you to escape this room?"

"I know that, Onyo. I don't want to escape any more."

"Be that as it may, even *contemplation* of escape would only be a waste of time, Baker. A waste that is not permitted!"

Baker was seated at a comfortable desk. On it lay the manuscript he had seen earlier in Onyo's study.

"The passages have been numbered and the numbers correlated with the recordings," Onyo went on. "Try free association. Then, when you seem to feel you have a clue, try the indicated memory recording.

"Further analysis is possible, Baker. But I think you will not need it. There are fourteen million meters of *metaltape* here—by far the most complete recording of a single man's mental time track ever made."

"I'll try, Onyo. You know you can trust me now," Baker said.

"You are a very intelligent and

well trained man, Baker. I should very much like to consider—after you have accomplished your task, of course—your joining with me."

"I want that—"

"Meanwhile, develop a working hypothesis. Recall the precise wording of your instructions. Ponder the words. What do they mean? What *can* they mean? What can they not mean? There was a purpose behind your assignment!"

When the scientist had gone Baker pondered the situation. It was largely a time problem now. The first test of his vague hypothesis had worked. Now to work out as many details and specifics as possible. Next would come a system of barricades he must put between himself and Onyo.

Baker used the tools Onyo had given him effectively. He listened to the carefully edited and concentrated tapes. He heard his mind reproduce almost magically all of the audio impressions of scenes and events of the past. He filled in gaps in his memory and added the new body of material from depths of his mind his memory could not readily reach.

Slowly his tentative pattern grew and matured. He got closer to the hard core of fact and interpretation that must logically answer the dilemma. Thus he was able to face Onyo's next visit with a confidence the other man interpreted as obedience.

"Well, my friend, how do you like your new job?"

"Hard work, Onyo, but I think I

am getting somewhere," Baker answered truthfully.

"Splendid. I have carefully refrained from interrupting your work, though I must admit impatience."

"I need some more information," Baker said. "My own mental time track isn't enough."

"I am prepared to supply your needs, Baker," Onyo replied with controlled distaste.

"You have a complete dossier on me—my discovery, capture, the rest."

"Yes, I have that," Onyo said evenly. There was a note of disappointment in his voice which Baker savored. "Though I fail to see—"

"Preliminary hypothesis," Baker explained. "I have to make a choice. I might be wrong, but has it occurred to you that I may have been suspected of treachery to Liberation? Suspected so strongly that I was deliberately given up for capture?"

"Not logical, Baker," Onyo snapped. "I can assure you—"

"But you can't," Baker said quickly. "At least not without a showing of evidence."

"But I fail to see—"

"Neither do I, Onyo. But you asked me to find a working hypothesis and work it through. Even if I am wrong, I am obliged to prove it."

"Baker—" began the older man. Then, seeming to change his mind, he continued, "Very well. You will see that you are quite wrong. You were not suspected of any treachery. That is certain. But your objective approach is logical. Although I must warn you, should you try to stall—"

Onyo, Baker was thinking happily, there is a contradiction in the very nature of your problem! You *must* trust me!

Onyo was right of course. The dossier showed simply that Baker had been discovered through a routine investigation. Someone had discovered that his files at the University of Hononolya were forgeries. His real identity had been established through a check of the Unity party's incredibly efficient identification bureau records.

The document ended with an entry to the effect that Agent Baker had been sent to the laboratory of System Politicophysicist Ah Cien Onyo for "interrogation as to the exact mission of Agent Baker, it being deemed unlikely that (1) an agent of John Baker's rank and training would be sent on so mundane a mission as that indicated; (2) that more complete precautions against capture were not taken unless in fact *Agent Baker was not intended for capture!*"

Diabolically clever—but not clever enough to see that this is precisely what Liberation had apparently wanted all along!

Baker closed the dossier and permitted himself the luxury of his first burst of laughter in many many months. If Onyo were observing him he would pay for it, but there was no denying himself the act.

"But why would they want me captured unless they thought I was

“rattling on them?” Baker was protesting.

“Baker,” Onyo began obviously seething inside. “The asking of that question makes it obvious to me that you hope to stall.”

He advanced on Baker his eyes boring into him fiercely. Baker braced himself and prepared his defense, such as it was. The necessity of what was coming helped him prepare.

“Your act causes me to doubt I achieved quite the right balance in your preparation. You are as aware as I that there was a precise motive for your being captured and that that motive was not an attempt to dispose of you. I am sure the Liberation committee has more refined methods of dealing with its traitors.”

Baker gauged the fury of the other man carefully. At the right moment he dropped to his knees. “Onyo!” Baker pleaded. “Wait—prisoners, other prisoners. Do you have them here?”

The other man stopped his advance. “What are you telling me, Baker?”

“That I think I was meant to be captured and sent to an agent’s camp—perhaps the one you have here—to give them some sort of help.”

It was dangerously close to what Baker suspected to be the truth. Nevertheless, the part must be played, even though the script was incomplete.

Slowly Onyo’s grim face changed. “Close, Baker, close. Not true—Liberation knows more than that—but

close.”

He seemed to pursue a new line of thought. Then, smiling, he motioned to Baker.

“Come with me my friend. I shall give you more information.”

Onyo led the way through a strange passageway. It seemed to open up for them through the solid wall at some unseen signal from Onyo. They had gone perhaps a quarter kilometer when the man indicated a turn to the right.

“Go ahead, Baker,” he ordered, indicating the way down a narrow, unlit passage.

Baker’s footsteps echoed through the dark passage. From time to time he contacted the cold, unseen walls and corrected his course. Gradually the quality of the sound of his footsteps changed, the echo indicating a larger chamber ahead.

“How far, Onyo?” he asked after about a hundred meters.

Suddenly the passage was illuminated. The sight before him caused him to cringe back. He found himself dangerously close to the edge of an enormous pit, perhaps twenty-five kilometers across. It dropped down a full ten kilometers. Stepping back to a safer footing he looked down again. The laugh of Onyo echoed down the corridor and up from the bottom of the pit.

Below was a gray, slimy mass of flailing humanity. It was difficult to distinguish complete forms, so hideously entwined were the naked bodies. They wallowed in a quagmire of human filth and muddy

water. The light caused them to writhe snakelike on the bottom of their hideous pit. Periodically an inhuman cry would issue from the mass. It was the cry of neither human nor animal, but of some primordial life form—or perhaps of terror and hate and death. There was an indescribable odor of horror and filth and death rising from the pit.

“Take a closer look, Baker!” commanded Onyo. “Better still, go to them and help them!”

Instantly Baker felt the burden of Onyo’s irresistible suggestion. He grasped at moist, slimy walls, but could not resist.

He would never know how long the nightmare lasted. He would recall until the day he died the dull *splat* of his body on the mass of lost humanity below. He would recall the shock of pain, the palpable stench, the sounds, the slimy contact of bodies, then the tear of tooth and nail—

Awareness of Onyo and the vague outlines of the laboratory clinic emerged from the horror and pain. Somewhere he heard the familiar shuffle of Goyone.

“Your hypothesis would not stand up, eh Baker?” Onyo mocked.

“No . . . no—” Baker groaned. There was no necessity of feigning horror.

“Your little experience with *them* proved it. It also should indicate to you the merits of complete co-operation!”

“Yes, Onyo,” Baker said submis-

sively. His mind raced to free itself from the horror of the experience. There would be little time left now. A single opportunity. He must take advantage of it. But, his body screamed for a chance to repair itself. When would it come?

“What is the delay, Goyone?” Onyo snapped at the bent back of the old physician.

“I am preparing my scalpel, master,” he replied. “I am *honing* it.”

Baker caught his breath. It would be necessary to control himself very carefully now.

“Onyo—an Agent *Miller*—was there an Agent *Miller* down . . . there?”

“Miller? I recall none. But Baker I should hesitate to trust any impression I received at the bottom of that pit.”

“Yes . . . I suppose you are right, Onyo. I once knew an Agent *Miller*—” He allowed his voice to trail off.

Peaceful, restful sleep enveloped him. For he *knew!*

Dorkus, Hoening, Miller.

But every attempt he made during the next two days to establish some kind of knowing contact failed. His first overture, a whispered question, was interrupted by a fierce slap across the face. A faint hand signal—the hand clasp of Liberation—gained him only a command to sleep, together with a string of muttered curses. He could not even catch the eye of Goyone for a wink. The man seemed to have lapsed back into the fantasies of his senile psychosis.

Was he being warned? Or had he been wrong? The latter alternative oppressed him. Perhaps he had only tapped a kind of reflex by his reference to Dorkus. Possibly Goyone had heard it as *darkness*. And honing—Hoenig. It could be a simple trick of desire fulfillment. And Miller. Perhaps the flash he had perceived in the old man's eyes existed in his own imagination only.

Baker tortured himself with such doubts. Try as he may to keep alive the flame of his one last hope he inevitably succumbed to numbing doubt. Even as he dreamed of the accomplishment of his assignment, the assignment he was slowly beginning now to know, he watched the growth of fantasies of failure.

A week passed. Onyo began once more his twice-daily visits. He urged Baker to use the clinic period constructively, he hinted at impatience, he gradually became more insistent. Finally Baker knew his time was running out—would inevitably run out if Goyone remained silent much longer.

It came when he least expected it. Goyone was bending over him to fasten the electrodes for a treatment. Baker opened his mouth to speak and instantly recoiled from a sharp blow across the face.

"Silence, traitor, while I prepare your treatment," Goyone snapped.

Baker lapsed back into a sullen and bitter mood. He allowed the platinum bracelet electrodes to be snapped on his raw wrists. As he felt the first eddies of current needle

through his arms, he knew the depths of despair.

Suddenly the full strength of the current caught him. Artificial synapses convulsed his muscles paralyzing him. He became aware of a pulsing hum building up somewhere within him.

"Dorkus, Hoenig, Miller"—the words resolved themselves out of the hum!

Madness! Baker wrestled with the idea—

"Baker," the voice of the electricity said again. "Baker, have courage. Receive this message. It is the *only* way of my communicating with you. There is no safe way for you to communicate further with me. Pay close attention.

"Dorkus, Hoenig, Miller are the words I have waited these many years to hear! You have somehow divined that the words were meant for me. You are correct!

"The assignment Onyo has been trying to force you to disclose is to come here to contact me. You carried within your body and completely unknown to you a tiny capsule of Hercon, a drug that furnishes me our only chance of escaping and at the same time fulfilling our assignments. I have that capsule now.

"Here is what you must do," the voice within him continued. "Return to Onyo. Convince him that you are willing to give him what he wants. Work with him, tell him anything but the final truth. Ultimately you will be unable to withhold even that. *But in any event give me twenty-*

four hours in which to prepare!"

Then the paralyzing carrier was turned off. Baker fell back limp and terribly tired into the bed. But this time there was no denying the hope that was his!

The deep rents in Baker's flesh, incompletely healed by Goyone's treatment, protested the effort of walking as Baker tried to keep up with the quick strides of Onyo. Each spurt of pain brought back some of the horror of the pit. But Baker's mind forced its way through the threshold of pain and fear and mapped a system of mental barricades against the ordeal that certainly was coming.

The whip lash of Onyo's incisive mind began at him immediately. Baker had scarcely placed himself at the recordio controls when the interrogation began.

"What is *Dorkus, Hoenig, Miller?*"

"Don't know, Onyo. I have no record—"

"What do the words mean, Baker. Try a meaning—think!"

"They were the agents I was supposed—"

Onyo's bony hand slashed across Baker's face. "Omit the obvious, Baker. What *effect* do the words have?"

"I . . . I don't know!"

"Think! Dorkus. Take the word apart. Associate. Dorkus—Darkness. Dorkus—what are you thinking?"

"Tried that. Don't know—" Baker was wiping away the blood from his nose. He received another slap for

his reply.

"*Hoenig*. Think! Hoe—instrument of ancient husbandry. Hoe-nig—What is in your mind?"

Baker was on the floor from a sharp, fisted blow.

"Dorkus, Dorkus, Dorkus, Dorkus, Dorkus. Hoenig, Hoenig, Hoenig, Hoenig, Hoenig—"

A kick jarred Baker's whirling head. But the pain was a temporary barrier against the words.

"Miller, Miller, Miller, Miller, Miller—"

"Dorkus was an agent—" A stab of pain ended the lie.

"Dorkus, Dorkus, Dorkus, Dorkus, Dorkus—"

Gradually, despite all that Baker could do, an almost imperceptible change took place. The words became tools, tools that probed and pried and picked at the tiny central kernel of the truth he must hide. Barrier after barrier fell under the onslaught of the words, the hypnotic effect of Onyo's voice.

How long?

The words became unfeeling robots storming a citadel. On and on they marched, the rhythm of their feet set by Onyo's voice and accented by painful slaps or kicks.

"Hoenig, Hoenig, Hoenig, Hoenig—"

How long? How long?

The words became lances or doctors' probes. They picked at the kernel of hidden truth, sought a seam, a weakness—

"Miller, Miller, Miller, Miller—"

Baker tried to interpose a black

screen. Death—was it possible now to will it into existence? No. It would not stay. A white vision of hope swept it away, exposing once more the truth to the keen-edged probes of the words.

How long? How long?

Baker fenced with the words, turned them frantic inches at a time. But on and on they came and he was very very tired.

And then he could stop them no more. The edge of a word seemed to find its way to the door. Baker wrestled, strove to catch the door, fought—but failed.

“What about Goyone, Baker?” Onyo’s faraway voice asked. “Why did you say ‘Goyone,’ Baker?”

“Goyone—” Baker could hold it back no longer. All his strength could not stop it.

“You were sent to contact Goyone!” It was a statement of fact. “You contacted Goyone!”

The truth was exposed now. The sickening awareness of it pervaded Baker’s mind.

“Yes, Onyo, he was sent to contact me and he did so.”

“Goyone!” Baker heard Onyo shout.

“Yes!”

“Drop it, Goyone! I command you drop your weapon!”

Baker forced himself to his knees.

“Sorry, Onyo. The Metalobe is gone. You cannot command me now!”

“Goyone!” shouted Onyo franti-

cally. “Drop your weapon or I shall destroy Baker!”

There was a leap of blue flame. The limp body of Onyo fell across Baker.

“Goyone!” Baker exclaimed freeing himself. “You got here just in time. I—”

“It was inevitable, Baker. But you succeeded in giving me enough time. There was no way for you to hold out longer. But we’ll have to act quickly.”

The old man’s voice was suddenly alive. There was a powerful alive quality to it. In the same way Goyone’s tall body had somehow lost much of its age. He was rapidly searching Onyo’s body.

“Here it is,” Goyone exclaimed. He produced a small metal disk. “Here is the secret of Onyo’s power!”

“What is it?” Baker asked.

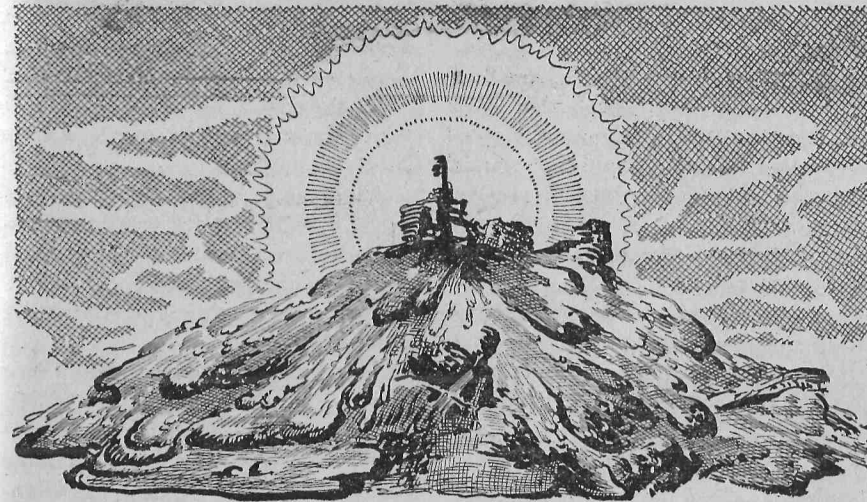
“The Neuron carrier wave projector. The secret of Onyo’s power to control your body.

“*The receiver is implanted in your brain, Baker!*”

“What?” Baker exclaimed as he helped search Onyo’s clothing for weapons.

“You see, Baker, neither Onyo nor anyone else has yet solved the problem of true thought control. Onyo—a very brilliant and completely insane scientist—found a way of side-stepping the issue.

“While you were unconscious he performed an exceedingly delicate operation upon you. He inserted a



tiny object called the *Metalobe*. I won't go into details now, but the principle is fairly simple. The Metalobe has the power of translating a kind of electrical communicator beam into neural energy. The beam was modulated by this disk, a small but powerful transmitter.”

“That explains a lot,” Baker said.

“Baker, it partly explains the Unity party—but more of that later. Repeat to me the exact wording of your assignment.”

Baker began. “I was to meet a Dorkus, Hoenig, or Miller when I gained entrance to the Mental Banks. *But the Mental Banks are actually here, aren't they, Goyone?*”

“Yes! The entire success of your assignment depended upon your discovering that single fact, Baker,” exclaimed Goyone.

“I suppose I should have realized it earlier,” Baker continued. “But I didn't become fully sure of it until I worked my way through another line of reasoning.

“I was sure I was meant to be captured. So was Onyo, for that matter. But the thing that seems not to have occurred to Onyo is that the Liberation committee not only wanted me captured, *but wanted me captured in such a way that it would look suspicious—so I would be sent here to this laboratory!*”

“Precisely!” Goyone interjected.

“Otherwise I would have rotted in some agent's camp.”

“But how did you recognize the fact that it was *I* you had to see—instead of those at the bottom of the pit?”

“That is what Onyo would have

called 'creative thinking,'" Baker smiled. "But I call it simple guesswork. Other than the fact that Dorcus, Hoening, and Miller are key words, I still don't know exactly what they mean."

It was Goyone's turn to smile. "They were friends of my childhood, Baker. Three children I used to roam the neighborhood with. The Liberation committee and I agreed to use them purely arbitrarily."

"If there were any changes in my orders, I was to be notified that a book was available at the *Mesa* bookshop—" continued Baker.

"Onyo was a brilliant scientist," Goyone interrupted, "but he was a specialist. *Mesa* is an ancient word. In the archaic Spanish language it meant simply, *table*. This was a reference to the tiny Ergenon receiver which served as my single outside source of information since coming here. I smuggled it in hidden within my flesh. It was hidden in an old medical book on my laboratory *table*! Fortunately that had been agreed on by the Liberation committee before I left them."

"But I thought you were sent back to the committee with a Metalobe," Baker said puzzled.

"Quite right," Goyone said. "It was the sheerest luck that I was shot down by one of our own guards. I sustained a deep head wound. It was in the process of repairing the damage that the Metalobe was discovered by our scientists."

"But why didn't they remove it?"

"Because I could never have played the part of a man with a Metalobe, Baker. You have no idea of the horrors I perpetrated on our own captured agents while under Onyo's command."

"Liberation anticipated that, too. But if it wasn't me it would be another captured zombie scientist. And with me, Liberation could have hope of finally destroying Onyo and his Mental Bank!"

"*Wheel!*" exclaimed Baker. "But back to my assignment."

"Lacking any other means of escape I was to go to a field of rubble five kilometers northeast of Glenopoli . . . but Onyo said there was nothing there . . . and board the patrol ship I was supposed to escape in."

"And Onyo was right," said Goyone. "You were given three-dimensional co-ordinates. The fourth—*time*—was wrong. But that ship will be there at the proper time!"

Quickly the two men gathered up the contents of Onyo's clothing.

"I think we are still undiscovered, Baker. That means we have approximately fifteen minutes."

Baker followed the old physician through the door into a dim corridor. Questions buzzed in Baker's brain. There were still too many missing pieces.

"I still don't understand about the capsule the committee planted in me, Goyone."

"I was as much under the power

of Onyo as you were," Goyone explained in a low voice. "My brain was controllable by the Metalobe, too. Thus I was powerless until you brought me the capsule of Hercon, a rare and exceedingly powerful hypnotic which, in effect, paralyzes the area of the brain on which the Metalobe acts."

"Freed temporarily of the Metalobe I had time to perform an operation upon myself and remove the instrument. That was the twenty-four hours you gave me, Baker."

"But how did Liberation know you were even still alive?"

"They couldn't be sure, Baker. I have never dared try to contact them. But you must remember, Baker, that this assignment of yours and mine is in the nature of a last desperate chance. Onyo's science gave the totalitarians the last weapon they needed to perpetuate this terrible regime."

"Unlike the ancient totalitarian regimes which fell from internal pressures that could not be controlled, the modern system state has at last gained the power it needed—or very nearly that power. The Liberation committee saw the inevitability of this years ago. This assignment was the last, the only answer, Baker!"

"Halt!" cried a voice from behind them.

Cursing himself for his lack of attention, Baker made a move to grab his pocket blaster.

"Don't, Baker!" exclaimed Goy-

one, then, seeming to address the unseen guard, he said: "You find yourself unable to use your weapon. Guard! Come into our view!"

Baker realized that Goyone was speaking into the disk. Almost at once the guard appeared. He still held his rifle blaster in firing position, but he seemed unable to release its deadly beam.

"Incredible how Onyo's lust for power makes this possible," Goyone said as Baker removed the blaster from the stiffened fingers of the guard.

"Every person in this castle has a Metalobe implanted in his skull. Capture this tiny metal disk and you occupy Onyo's shoes precisely. Had he been able to control himself, this guard would have blasted us!"

Baker shouldered the guard's weapon.

"Lead us to the Metalobe vault, guard!" Goyone commanded. Some part of the man's mind seemed to fight the order, but the only effect was the appearance of beads of sweat on the man's brow.

They were quickly led through a maze of stone passages. There seemed to be no end to Onyo's castle. Baker kept the blaster handy.

"Be prepared to use that, Baker," Goyone said. "These guards may have orders to fire on sight. I might not be able to gain control of them quickly enough."

It was as Goyone had predicted. The first burst felled their guide. The second burst did not come. Baker

fired twice quickly killing two guards who stood in front of the vault.

"There is a way of opening the vault with this disk. But there's no time for experimenting. Blast it, Baker, aim at the suspension beams."

A dozen well-placed bursts from the powerful weapon tore through the resistant Duranium door. Quickly they were inside.

"Here is your modern totalitarian state, Baker—or the beginnings of it," Goyone said pointing to row upon row of tiny metal drawers. "Each one of these contains a Metalobe. Implant one of them in any potential enemy and you can make him as submissive as the gentlest child.

"Adjust it to a communicator frequency and you can send him back to his friends and fellow conspirators. There he is an ever ready time bomb, instantly willing to betray, to murder, to steal, disrupt on your command!"

"You can control actions, Goyone," Baker said. "But can you control thoughts?"

"Not yet, Baker. But some of Onyo's later experiments— Fortunately he had to allow you a large measure of self-initiative.

"Use your blaster, Baker. We'll destroy the vault and the disk. Thank God there was only one Onyo and one Mental Bank."

"Wait," Baker said. "Save the disk and I'll gather up a few of these things and salvage them. We capture

a few prisoners too, you know."

"No, Baker. The Metalobe is the product of a totalitarian science that needed it. It was created by a thoroughly insane mind and, so far as I can see, is entirely negative. Sanity will produce a variation of the Metalobe in its own good time.

"Meanwhile, there is no group of men in our age that could have a legitimate use for a Metalobe. When man has finally overthrown the last vestiges of totalitarianism—and that isn't far off now—then humanity will be able to absorb the research of Onyo, today's 'dangerous ideas.'"

Baker used the blaster efficiently. A molten puddle of metal marked the final end of the Mental Bank.

A kilometer away, Baker and Goyone admired the evil beauty of Onyo's castle through the Transplast ports of a patrol craft. Baker, seeing it from the outside for the first time, mechanically felt his hands over the familiar controls.

Suddenly the Thermigen bomb they had planted unleashed its fiery fury bulging the old stone walls in a volcano of molten metal and rock. There could be no regret. Nothing remotely belonging to the world they would now help construct lay within that castle.

"By the way, Baker, do you know where you are?" Goyone asked.

"No. And I don't know how you found this ship either."

"We're five kilometers northeast of Glenopoli!"

THE END

ASTOUNDING SCIENCE-FICTION

FRANCHISE BY KRIS NEVILLE

When a franchise gives an outfit a legal monopoly, there's only one solid way of breaking that monopoly. But finding it isn't always easy — which is necessary to make it work at all!

Illustrated by Miller

All of his life Carl Harrill had wanted a million dollars. As a child he had imagined such a sum as an endless stretch of lollipops. As a boy in college, he had calculated its extent in bottles of beer. And now that he was thirty, it had taken another, perhaps more serious, form; it had come to mean a quiet hundred acres in the Ozarks of Earth, a single hydroponic garden, a deep-running stream pregnant with fish, a collection of music tapes—the expensive set, going all the way back to Bing Crosby—a microfilm classics library, a life subscription to a half handful of magazines, a comfortable house

with all the modern attachments, a new model helicopter, a . . . oh, yes, he had thought about it at length.

However, as a practicing trouble shooter working out of Venus port, there seemed very little chance of getting anywhere near that much money. Hope, none the less, mushroomed eternally within him.

Then one day, two and two suddenly made a very startling four, and the glowing vision of a cool million no longer seemed quite so far away.

It came to him while he was out on a routine service call. Swamp rust had eaten through the cross-continent surface cable. Operations local-

ized the break and sent him out in charge of a repair unit. Heavy fog vapor was upon the northern continent, and aircraft flying was uncertain. He took the mud-hog. It wheeled along at a monotonous ten miles an hour while the treads throbbed out a sleepy *slap-slop-slap*. All around there was nothing but the uncompromisingly bleak mud vistas of Venus. After hours of the fog-filled tedium, Carl Harrill pulled the mud-hog in at relay station Number Four. The crew got out for a stretch.

The attendant was so glad to see them that he put on his suit and came out. "Hi, Splay-feet. 'Mon in for coffee."

The six men entered his quarters. They were comfortable accommodations, but they were as lonesome as a graveyard at midnight.

"Glad to see you guys," the attendant beamed. "You out after the break?"

"Uh-huh," Carl Harrill admitted.

"Look—maybe you guys'd do me a big favor."

"Maybe. If we can."

"Well, how's about sanding the rust off my plexiglass dome; it's been worse than usual lately. Ain't nothin' to see outside, but just the same I'd like to look out once in a while."

Carl Harrill looked at the windows; sure enough, they were thickly coated with the ubiquitous swamp rust.

"Sure." Carl Harrill turned to the crew. "You guys mind blasting it

off?"

The foreman rubbed his stubbly chin. "Yah, we can do it."

"That's fine. Thanks," the attendant said. "I'd sure appreciate it."

After a bit the crew went outside and turned the sand spray on; it cut the rust away magically.

"Gee. I can see out again," the attendant said. "I feel like a man getting out of prison."

"I'll bet. This swamp rust is a nuisance. Too bad they can't rig up a defroster," Carl Harrill commented.

"Yeah," the attendant agreed. "That always puzzled me: why can't they? You know?"

"Uh-huh," Carl Harrill said. "I'll tell you." He took out his pipe and tapped tobacco in it. He lit it. "Ya see, swamp gas is plenty active. In fact, about the most active stuff on wheels. It combines with everything, which is why everything on Venus is covered with its rust." He blew a puff of smoke at the ventilator.

"The chemists came over to analyze it. They finally gave up. Once they waited a whole month for a pure spout of it just so they could get some of it, uncombined, in a bottle. Took it back to the lab. Only what they had wasn't pure swamp gas any more. It had coated the inside of the bottle, leaving a rather high order of vacuum. Then, for a while, they thought about using it as an evacuator, but it turned out to be too hard to collect. So they tried leaving everything they could think of out in the atmosphere: gold, dia-



mond, iron, talc, et cetera, et cetera. It combined with them all, O.K. But they couldn't figure any commercial angle, so they finally gave it up."

He sighed and sucked deeply on his pipe. "Now we come along and undo whatever damage it causes."

"Well, I'm sure glad to get the stuff off my windows. Thanks again."

"Sure. Sure."

Carl Harrill sat in silence, thinking. Funny stuff, all right, swamp gas. He chuckled about the chemists and the bottle. Can't even collect a pure sample. His thoughts slowed to a snail's pace, and then they back-

tracked.

He remembered old Doc Foster. One of the best engineers in the system. Years ago he had attended one of Foster's seminars.

Doc had said: "Give me any problem: I'll give you a theoretical solution." That embodied his teaching method. Start with a problem; break it down to the essentials; solve it. On paper. Quite simple. At the seminar, one of the students had suggested, almost facetiously, that he tell them how to bottle swamp gas. The class had laughed, but old Doc had taken him at his word. For a week he and the class struggled with the problem. At the end of that time,

they had reached the conclusion that there was only one way it could be done. All that would be required was a complicated refrigerator system using a cushion of any of the inert gases. Whereupon, the class forgot all about it.

Wheels within wheels began to whirl wildly in Carl Harrill's brain. He jumped up and snapped his fingers.

"I can *bottle* that stuff!"

"Looking up, startled, the attendant asked, "You mean swamp gas?"

"Of course, of course," Carl Harrill muttered vaguely.

"So what? According to you, that's about as useful as being able to grow a third thumb."

"Huh-uh," he grunted negatively.

"How come? You said yourself that the stuff ain't no good."

"Intrinsically that's right, but then the old iron bar you have layin' around in the cellar is no good 'til you need a lever."

Carl Harrill stood up; outwardly he was calm. He emptied his pipe and started to get into his suit. "I'll get my men on the break, and then I'm slappin' mud back to V-P. 'By."

"Well, so long. Drop in any time."

Carl Harrill was in the act of buckling down his helmet. He hesitated. "Jackson," he said, "when I leave this nutty nightmare called Venus, I ain't never comin' back!" He let the helmet fall with a decisive ring.

Within three months, he was ready to leave. He had a bulky suit-

case that contained his model reefer — refrigerator unit — filled with a small quantity of swamp gas, cushioned on layers of all the rare elements.

It is impossible to overstate his enthusiasm; no sooner was his model safely stored away than he stalked into the head office and slammed down his written resignation.

The chief was quite startled. "Have you thought about it, Carl?"

"Uh-huh," Carl assented.

"You know what it means?"

"Uh-huh."

"If you break this contract, we have to blackball you. That means no job *anywhere* off Earth. You'll be Earth-bound, you know that?"

"Uh-huh."

The chief shrugged. "O.K. I hate to see you go."

"Thanks. 'By." Carl Harrill walked out of the office.

On his way to the spaceport, he told himself, "If this falls through, Carl, old sock, your goose is done to a turn. If this falls through, you'll have to teach school; and on a salary like that, you'll never be able to put away even two dollars for a rainy day."

"Uh-huh," he answered himself.

He caught the first Interplanet passenger ship to Luna. It was a pleasant voyage. The landing was the famous "feather-bed" type widely advertised over telecasts. "We can park a ship on a crate of eggs and never break a one; you drift down on a feather bed—"

They tugged the ship into the dome.

Carl Harrill strode down the ramp just as if he already had his million dollars. He stood for a while and watched the carriers shuttle cargo off the Interplanet ship and onto the E-L Lines "elevator." He shook his head as if he were feeling sorry for somebody, and then he began to laugh.

A pair of mechanics stopped and looked at him.

"You O.K., fella?" one asked.

Carl Harrill stopped laughing. "You guys work for that crummy outfit?" He jerked his thumb in the direction of the E-L Lines.

"So what, bud?"

"Better start lookin' for a new job, then, Jackson."

The mechanic looked at his friend. "He's nuttier'n' a fruitcake."

Carl Harrill walked away whistling.

The main office of Interplanet, Inc. was the huge building on the side of the dome near the spaceport passenger locks. Carl Harrill walked jauntily up the flight of Earth-marble steps, through the revolving doors, and into the vast lobby. He checked the directory; the man he wanted was on the eighth floor. He took the elevator up.

The rest of the building hummed with activity. People scurried everywhere. The eighth floor, alone, was quiet.

Carl Harrill opened the door marked "Reception Room A."

"I want to see Mr. Saunders," he told the pert blonde at the desk.

"May I have your name?"

She had a nice smile, he decided. He told her his name.

She checked the appointment file. "I'm sorry, Mr. Harrill. You'll have to have an appointment. The president is in conference."

"Look, sweetheart, save that for the yokels. I'm here about the franchise. I can break it."

She studied his face for a long moment. "You and every space lawyer from three planets. We have more people in here about that than the patent office has men with perpetual motion machines."

"But you listen to them all, honey," he said matter-of-factly.

"Yes. We have a lawyer—Mr. Johnson—who'll talk to you about it. Just a second—" She took out a form card, and picked up a stub of pencil. "How do you spell your last name?"

He told her, and while he answered the rest of her questions, he kept up a running chatter. "You see, I'm gonna sell this—six foot, three—and then I'm gonna go back to Earth—brown—settle down in the Ozarks—blue, I think—and raise a family . . . no, not yet, sugar . . . hunt and fish, and make like a lazy man."

When the card was filled in, she looked up and smiled at him. It was a sympathetic smile. "I'm sorry for you," she said.

He decided she was a very, very nice-looking girl; he particularly liked her eyes.

"I see them come in," she continued, "chock full of dreams, like you, and then I see them go out again. They leave their dreams in Mr. Johnson's office."

He noticed she wasn't wearing a wedding ring. Which, it seemed to him, was a fine thing.

"So don't feel too badly an hour from now."

He smiled. "Shucks, honey, how can a man feel bad when he's just made a million dollars?"

She sighed. "At least you're confident. Good luck, but don't say I didn't warn you."

"Wanna bet?"

She studied his face; and liked what she saw.

"Look," he continued, "if I don't sell this idea, I'll buy your dinner and show you the town. If I do, you foot the bill."

She dimpled. "It's a bet," she said.

Mr. Johnson read the card. "Well," he said tiredly, "tell me how you plan it?"

"Rule seventeen," Carl Harrill began, "states that if the E-L Lines fail to transport any cargo presented at either terminal, then, from that date, the franchise will be deemed void." He paused. "I can transport Venus swamp gas. I want to see them handle *that* cargo."

Mr. Johnson shook his head and sighed. "I'm sorry. If you can store it, they can find out how. They've got half the resources in the system behind them."

"Huh-uh," Carl Harrill dissented. "It's—"

"Please," the little lawyer interjected, "let me review the history of this thing for you. For thirty years, now, the best legal minds in the system have been trying to find a loop-hole in the franchise. They can't. Not that the courts wouldn't love to break it up; they would. If we could rig up even half a case, we'd get judgment in our favor in five days. But the franchise is ironclad."

He studied Carl Harrill's card. He shook his head and continued.

"When the Federation gave it to the E-L Lines, they weren't too careful. They didn't think that they were giving much away. They signed about what the E-L lawyers gave them. Now, for ninety-nine years they have the exclusive right, in consideration for having landed the first commercial rocket on the Moon, of handling *all* Earth-Lunar transportation, provided *only* that they do not discriminate against legal cargo, and that they remain solvent, for the franchise is nontransferable."

He settled back.

"The Federation obviously did not foresee that size and power requirements would make the Earth an impractical base for interplanetary operations, and that the Moon would become, of necessity, the interplanetary way station. So now E-L's Earth-Lunar 'elevator' handles *every bit* of material going to or from Earth."

"They've got us all, and it's quite legal."

"Yes, but—" Carl Harrill began.

"Look. Your idea won't work. Let me tell you a story. Ten years ago a firm known as Venus-Textiles spent some thirty million dollars bringing a fair-sized meteorite to the Moon. Tons and tons of naked rock. 'Now,' they said, 'let's see you set that down.' Well . . . E-L Lines put their engineering staff to work. And, sure enough, they set it down, right in the middle of Siberia. Then they billed Venus-Textiles for the job. It broke the company.

"Listen, son, no matter how much you spend, E-L Lines can spend more, duplicate your work, charge you for the labor, and . . . I'm sorry. We'd give five million dollars to break their monopoly, but—"

"Uh. Just a minute, Mr. Johnson. You got the wrong slant on this. Now, look, bottling swamp gas requires a rather complicated process, and—"

Two hours later Carl Harrill handed the blond secretary a voucher from Mr. Johnson. "This has been O.K.'d by Saunders over the telephone, but send it in for his personal signature, will you?"

She took the voucher, looked at it, did a double take, and said, wide-eyed and ineffectually, "Oh!"

After a moment, she murmured, "Unlimited. You did it! How?"

"Well, I'll tell you. He talked and I listened. Then I talked and *he* listened. Then he called in a bunch of legal lights and *they* listened. So. I got the go-ahead sign and the ex-

pense voucher. Now all I gotta do is earn my keep."

"I asked you *how*?"

He smiled. "Shucks, if you knew that you'd be about to make all kinds of money instead of me. But that's neither here nor there. You and me are going to see the town—on you."

She looked down at the papers on her desk. "I . . . I didn't think you'd come back."

"You didn't? That was the bet, wasn't it?"

"Uh-huh," she said.

He grinned from ear to ear. "I can see that I'm gonna like you. Just for that I'll put the party on my expense account."

She looked up and smiled at him.

At eight o'clock the next morning he arrived at the E-L passenger depot and bought a round-trip ticket on the "elevator". He carried his model of the swamp gas container with him.

And six months later, he arrived in a battered spaceship; he landed it on the East cargo grapple. They were slow about tugging him in because the port was busy. Finally, however, they jockeyed the ship, with the name *Little Bombshell* stenciled on the forehull in red, through the cargo space lock. He got out and stretched. His quarters had been cramped on the trip from the Venusian swamps. *Little Bombshell* was scarcely more than a flying frigid-*aire*; there were the twin blasters, the cargo, the reefer equipment, and,

in the remaining space, a six-foot bunk for his lanky, six-three frame. He hadn't slept at all well.

Still, he was cheerful.

"Hi," he greeted the mechanic who came out in a push-about. "Let her alone," he said, motioning toward the ship. "I'm shuttling cargo. But you can give me a ride over to Administration, if you want to."

"Sure. Hop in."

Carl Harrill walked into the shuttle office of the E-L Lines with a slow, rolling gait. He wore an innocent smile, and his blue eyes were bland.

He went to the desk of a second shipping clerk, handed the man his manifest from Venusport and sat down.

"Reefer cargo?" the clerk asked, seeing the "R" stamped on the paper.

"Uh-huh. Not normal reefer cargo, though. Special stuff: Venus swamp gas."

"Swamp gas?" the clerk repeated incredulously.

"Swamp gas," Carl Harrill insisted.

"Oh—"

"Well— There's nothin' wrong with it, is there?" he asked innocently.

"It's . . . it's . . . well, unusual." The clerk studied the paper. "I'm afraid it will require some special transportation, if it's hard to handle."

"It is. It will." Carl Harrill agreed, smiling warmly. "How long do you figure it'll take?"

The clerk shuffled the manifest

without answering. Then after a moment, he said, "This'll cost quite a bit."

"Uh-huh. Interplanet's payin'."

The clerk had been suspicious; that knowledge made him more so. "Look," he said, "if this is another scheme to break the franchise, you're out of luck, see."

"Why I wouldn't dream of anything like that. All I want is legal cargo transported—that's fair, isn't it?"

"Sure. Sure." The clerk glared at him. "Now look: you can tell us how your reefer is rigged and we'll build one like it, or you can make us hire a bunch of experts to find out. It'll cost more that way, but the results will be the same. If you can bring it here, we can take it down. We got resources. Lots of them."

"I'll be glad to tell you."

"Fine—" The clerk paused and then said. "I thought for a minute—" He shrugged. "Never mind."

He reached for a special-ship form. "If you'll estimate the cost—"

"About half a million, I'd guess."

"O.K. How long did it take you to rig it up?"

"Four months. But I was working practically alone."

"I see. Then we could do it in a month, probably." He stopped. He was still a little bit suspicious. "You know we have a special clause: We have to be given a reasonable time to outfit a transfer ship?"

"Sure. I'll wait. I've got lots of time."

"I'm glad to see you're being rea-

sonable. But it don't figure. What's the angle? This will cost Interplanet almost a million bucks just to transport a ship load of pure swamp gas that ain't worth six cents a barrel."

"Huh-uh, Jackson. You're wrong. It ain't gonna cost Interplanet a cent. But it'll shatter your franchise into about a million pieces."

"I don't—"

"Better think about it, Jackson. Call in a few of the legal wizards. Consider it a bit." He snapped his fingers under the man's nose. "Like that! This monopoly has gone for good."

He walked out.

And from that day, for the first time in the history of man, competition ruled the Earth-Lunar shuttle.

Betty, that was the secretary's name, asked him, the first night he got back, how he did it.

They were at the Starway Roof, dancing to the soft, dreamy music.

"Huh?"

"I said, 'How did you do it?'"

"Elementary, honey." He went

back to concentrating on his dancing.

"Come on," she insisted. "Give!"

"Well. I just fought fire with fire. They had a monopoly, so I got one, too. I patented my process to store swamp gas. Now, a patent is a monopoly. And that puts E-L Lines in a hole. If they use my process, I can sue them and get every cent they have—the courts have just been itchin' to hand down a judgment against 'em. If they don't use my process, they can't haul my cargo; and, under Rule Seventeen, that means they lose their franchise." He smiled, dreamily. "Either way, I make my million."

"Well, I'll be," Betty murmured. "You wonderful man you."

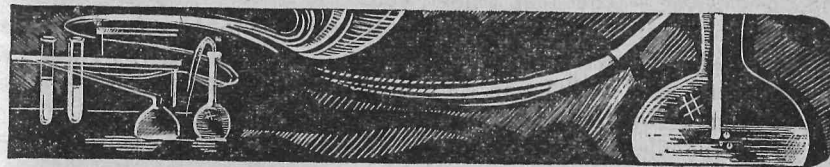
They danced twice around the room. "I've been thinking," she whispered. "About the Ozarks. And I'll bet I can tell you what you're thinking, too."

"Sa bet."

"You're thinking about asking me to marry you," she said, very softly.

"Uh-huh," Carl Harrill agreed.

THE END.



HIDEAWAY

BY F. L. WALLACE

Sometimes things can't be hidden in any normal way — there is no place to hide. But when that thing is not necessarily physical, there's a most excellent hiding place — and it's just as hard to find as it is good for hiding!

Illustrated by Cartier

"I am not the one you want," Pawl said. His body slouched forward and his head bent over wearily. "I thought I hated you, but now I guess I don't. You're nice." He hesitated and then volunteered this information: "You want my sister."

The slender dark-haired woman at his side answered promptly. "Yes, I am the one you want. Out there I wanted to destroy you," and she inclined her head at the forest that stretched for a thousand miles beyond the clearing. "Now that I am here I am not so sure. But if you set me free I will go on with my work. And I will not stop until I find the answer." She paused helplessly and glanced at the figure next to her. "You want my husband, too," she added.

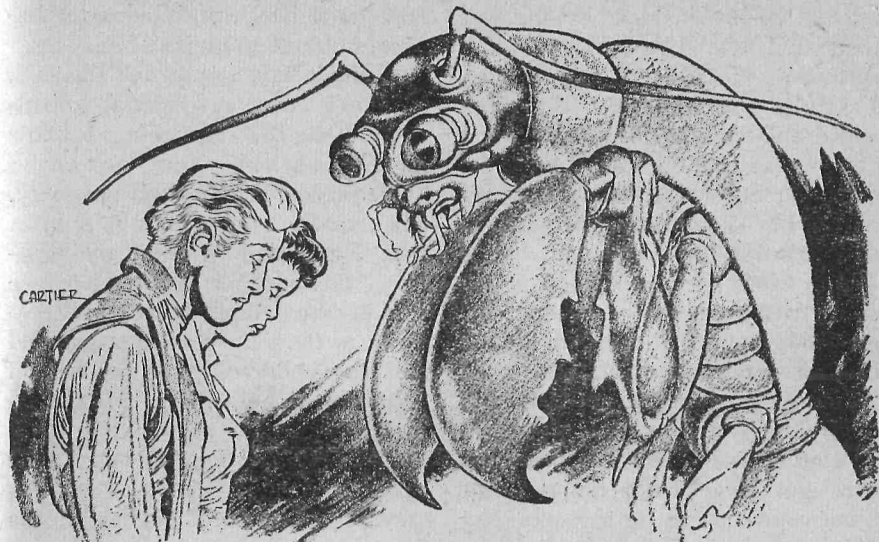
"Of course you want me," said the man. "Probability is my weapon. And I nearly had the problem solved. The fact that I evaded your random patrols for fifteen years is all the proof you need.

"You had better not let me go. Another five years work on my theory and you will never catch me. And once I know that it is possible to be safe from you, I will give the information to our scientists and they will decide what to do with you."

In response to the unspoken question he answered dully. "There are only two of us. I know of no other person you want."

The inquisitor swiveled his glowing eyes to the next in line.

Throughout most of the night the



investigation went on in the darkness. And when it was finished the people were divided into two groups. One group filed stolidly into the dully gleaming ship. The others knew that now they must leave.

And they walked away into the darkness, advancing in whatever direction they had been facing, stumbling over bushes and colliding with trees. In fifteen minutes Pawl could hear, though not very well. He stepped on a rattlesnake, but he did not notice; it coiled around his leg until it was torn off by the brush. It made no attempt to sink its fangs into his flesh. He could hear it thrashing slowly about on the floor of the forest behind him.

By degrees the functions of his mind came back; in the gathering light he could see obstacles in time to avoid them. As he put more dis-

tance between himself and the ship something began to trouble him; he tried to think but he could not. He tried to remember what he had left behind, but it was no use. He frowned stiffly as the branches whipped at his face and tore at his clothing.

Suddenly the sun came over the mountains and he blinked in the morning sunlight. He sat down on a log near a small stream, and as he sat there the paralysis left his mind. He knew that the ship had departed with its captives. And he remembered what he had left behind.

He buried his face in his hands and did not notice the blood that dripped over his fingers. He sat there for a long time before a voice called harshly to him: "I see they let you go, too."

He looked up to see a girl stand-

ing by the brook. Her clothing was torn and she was covered with scratches. He did not answer her. Painfully she bent over the creek and drank from it. Then she walked downstream and behind the partial concealment of the bushes she removed her short, one-piece garment and bathed in the stream.

She came back and stood at his side. "Better get in the water, too," she said. He looked at her dully and did not move. "Go on," she said. "No use thinking about it. You can't do anything for the ones they took. In two thousand years nobody has ever got away from the podians. Save your concern for the ones they didn't take—this time."

She was right and he knew it. At her continued insistence he got up slowly and bathed in the pool. The cold water cleared his head; the scratches burned and his eyes smarted. When he was clothed again he came back.

"Who did you lose?" he asked.

She grimaced. "No one—recently." He looked down at her as she pressed her hands hard against her head. He recognized the familiar symptoms. And he could see that even under the mask of pain that she was pretty. "How many times have they questioned you?" he asked sternly.

"Four times," she admitted. "Four times in the last two years."

"You've got to stop it," he said. "It doesn't do any good to follow them around, hoping you'll learn

how to resist them. You never become immune to podians."

"I don't have any plan," she said. "I don't have any special knowledge. I do the only thing I know how."

He looked at her in vague pity. She was a symbol of the human race. Brave and ignorant and helpless. "If you don't have a plan," he said harshly, "don't do anything. Go down to the village and get married and have children. Some day we will learn how to fight them." He turned to leave.

"Where are you going?" she asked.

"Back." He waved his hand in the direction he had come from during the night. "The podians are gone now."

"Can I go with you?" Her fear of being left alone was apparent; she was afraid, not of the wilderness, but of her own reactions to that ruthless mental violation. He nodded and she joined him. Together they retraced his path of the previous night. Soon she asked him: "Do you have a plan?"

He started to answer and then checked his reply. "No," he admitted. He did not speak his thoughts; he did not reveal the improbable idea which just then was forming in his mind.

"Then you're safe," she laughed bitterly. "If you don't know anything they can use against us or we can use against them, they won't take you."

"I am an indifferently good elec-

tronics man—" he started to say. He stopped speaking as soon as he recognized the words of the famous man.

"Is that a quotation from Hall or a definition of your own abilities?"

"Both," he answered shortly.

"Hall," she mused. "Hall and Steinberg. The great hope of mankind. And they failed. How long have they been dead?"

"Eighty years."

"I keep forgetting," she said, struggling through the underbrush.

"You've got to keep away from them," he said. "A few years rest and you'll be all right. But if you don't keep away from the podians, you'll die like Hall and Steinberg did."

"At least they died trying," she said absently. "They locked themselves and their wives in cages when they knew the patrol was coming over. And they died of cerebral hemorrhage when they could not obey the mental commands.

"And the kids," she went on wearily. "What did they do? They might have continued the work. But no, no sooner were their parents dead than they left like lemmings. And went to live with the podians."

"That's not exactly true," he said, climbing up the hill toward the clearing. "The children left all right. But they didn't go to the podians. It just happened that the podians built a new station close to the place the children settled on. They couldn't be blamed for that."

She was not listening to him.

"Like lemmings," she wailed.

"Stop it," he said sternly as he stood at the edge of the clearing and surveyed the wreckage. "If you want to get hysterical you can leave. I've got work to do."

She started to stumble away down the hill. He sprang after her, disgusted with himself and irritated at her. "Don't go," he said. "I was busy thinking about other things." He looked deep into her eyes. She was not pretty, he decided. She was beautiful. And not much more than a kid herself. He kissed her gently.

She smiled weakly at him and leaned against a tree.

He scouted the assembled craft for an intact plane. Small as the clearing was, any of the planes could have been landed in it easily if the humans retained their normal reactions. But under the control of the podians no one was normal; he had but one impulse, and that was to obey the command that permeated his mind. And usually they summoned only those who might be dangerous to them.

Not many of those who brought their planes to the clearing would return to claim them. Under the prevailing law of the times, such property belonged to him who found it and needed it.

Pawl located a small, finely constructed skycar which had been little damaged. Into it, from his own plane, which would not fly away from there without considerable repair, he transferred an electronic cal-

culator. He went back to his old plane again and searched through it thoroughly. But he did not find what he wanted.

"They took those, too," he said in despair.

"Took what?" asked Lura.

"The calculations and exposition of the probability theory."

"Were they any good?"

"He evaded them for ten years."

"But that could be accidental. The ten-year period is only a mean figure."

"No one working against the podians ever eluded them for more than twelve years unless he had a method. Besides, the two of them came to ask me if I would do some electronic work for them. If they had stayed where they were, they might still be safe," he answered bitterly.

"Nothing we do is any use," she said tonelessly. "Those calculations might have saved my father. Or they might still save my uncle, who is a mathematician."

Pawl got in the skycar. "Come on. I'll drop you off at the village. I'm going there to tell the villagers where the planes are. They can salvage them."

"You're not just going to the village," she said.

"He had another set of calculations. All the mathematicians do. I'm going to get them before the podians do."

"I'm going with you," she said determinedly. "Will you take them to my uncle?" She started to climb

in the skycar. The previous owner, in a grim jesting mood, had painted on the side a lifelike picture of the podian. The three segmented body, a surrealist lobster or a foreshortened, compacted praying mantis, stared at her with luminescent, stalked eyes.

She covered her face with her hands. "Those eyes," she said in a stifled voice.

"It's not their eyes," he said. "No, not their eyes."

A planetary zoo, an old writer had once called the earth over which Pawl and Lura flew. But that was only a partial definition. A case hardened university, maybe; a grim research center, perhaps; a prison, yes; a world-wide rat maze certainly; it was all these things in varying degree. And, of course, it was a zoo; the bars were there though they could not always be seen. And the bars would not stay in any one place. Sometimes they inclosed a continent; again, only around a small area would the force fields be erected while the mind patrols combed the population for those who could be of service to them.

A zoo where the animals came to look at the people, and where one set of bars were never moved—those that inclosed the entire planet.

And the one hundred million people did not make much of an impression on the wilderness that had triumphed as the population dwindled under podian occupation. Here and there was a village, located near the mouth of a mine; and around the

village were small cultivated fields. It was a world of contrasts: hunters with parabams, atomic scientists, and farmers, isolated communities, and nomads who roamed the sky in small, simple but exceedingly fast planes.

"Where did they have their headquarters?" Lura asked as they started out the following morning. Her face was less drawn and tired than it had been the previous day, and the scratches had all but healed under the expert medication of the villagers.

"I know—approximately," he admitted.

She was worried. "Then we shouldn't have stayed at the village last night. We know the podians will send for it. If we can't go straight to it, we may be too late."

"I don't think so," he assured her with an ease he did not altogether feel. "They have many things to send for. It may be weeks before they get there. It probably isn't very important to them."

Two days later they still had not located the building that had been both laboratory and home to Pawl's sister and her husband. "Maybe I should take you to your uncle," he suggested as they swept over the woodlands. "I can come back later and look for it."

She looked at him in amazement. "That would just be giving it to them. No, I'm staying with you until we find it."

His response was to notch the

skycar into higher speed. He glanced appreciatively at the indomitable figure beside him and then resumed the endless peering at the terrain below.

That evening, at sunset, they found the house, on a hillside, under the cover of great beech trees. They searched in haste through it. It was dangerous to be here at this time. Whenever possible the podians avoided sunlight. Radarlike perceptions enabled them to see at night as well as humans could in daylight. Their eyes, terrible though they were in appearance, had been evolved on a dark planet; they functioned well only under low intensities of visible radiation.

Regular patrols went on ceaselessly, day and night; but special patrols, such as would be sent here; came preferably in darkness.

Toward midnight they found the spool on which the calculations were recorded. They came out of the house and looked cautiously around. Far away a characteristic dim glow of light moved across the sky, and it was headed directly toward them.

"We'll have to get out of here fast," he said. They ran to the skycar. "Do you know how to operate this machine?" he asked.

She frowned. "Not without instructions."

"That's what I wanted to hear," he said.

He could feel the familiar and dreadful numbness steal into the fringes and corners of his mind as the podian ship came swiftly nearer.

He punched a space-time-direction sequence on the robopilot. Working against increasing mental pressure he dismantled the manual control and threw it out. He started the motor and notched it into full speed. The skycar leaped abruptly upward.

He fell against the forward panel. He fumbled desperately in the compartment at his feet and found a heavy instrument. He thrust it into Lura's hand; then he slapped her viciously. The muscles in his body knotted convulsively as his senses gave way. "Hit me," he said incoherently. "Hit me hard on the head."

When he regained consciousness the skycar was hurtling alone through the night. He rubbed the cramps out of his arms and looked at Lura. Her face was illumined faintly by the glowing instruments. He wiped the sweat gently off her forehead and ruefully touched the red welt on her face. Soon she awakened dazedly.

"Sorry," he said grimly. "I had to take the easy way out. I could fly it and you couldn't. Was it bad?"

She shook her head but could not speak.

He peered intently through the darkness and then began to work on the robopilot. By this time she had recovered enough to speak: "Now what?" she asked.

"Lucky for us a robopilot is a sturdy instrument," he said. "When I fell against it I damaged it a little. It's going to be some job setting it down." Nevertheless he managed to

land the plane without incident. They slept exhaustedly until morning in the skycar.

In a short time he managed to repair the robopilot and fashion a new manual control to replace that one he had thrown away.

"We're ready now," he said. "Where do we go?"

She grinned ruefully. "I know where he lives—approximately. That is, if he hasn't had to move."

"That's what they want," he nodded soberly. "Independent experiments. New theories, new devices. But not enough co-operation to be dangerous. They keep us always on the move. But some day—" He did not give verbal expression to the old dream that sometime mankind would find a hideaway where the podians could not penetrate.

They found the mathematician with little difficulty. He came hobbling out of a house that was much smaller than necessary, considering the abundance of cellulose all around. Pawl walked away in the woods, leaving the two alone for a while.

He paced about under the trees. He was growing impatient. The idea which he had so casually conceived a few days before was growing in importance in his mind. Perhaps he was presumptuous in thinking that he might succeed where so many others had failed; yet there it was, he could find no flaw in his idea. He would have to investigate it.

But not before he had seen to it

that Lura would be safe—if there was such a thing as safety.

When he got back to the house food was waiting for him. Old Vandergrift was in an expansive mood as they ate. "Took it up late in life," he said, noticing Pawl's glance at his white hair. "No one lives to be as old as I am if all he does is try to dodge them."

"Don't have much social life, either," continued the old man. "Nor much opportunity to see what some other person is doing in my line of work. We could make more progress if we could all work together. But, of course, if they took one of us, they would have all of our most advanced theory. As it is, one of us may discover a way to keep ahead of them, permanently."

"You're a theoretician," said Pawl. "I'd like to know your opinion of the patrols."

"Sure," said Vandergrift, looking keenly at him. "I suspect your interest is more than casual." Pawl nodded.

The old man thought for a while before he spoke. "First of all the patrols are a compromise. A compromise between what they want in terms of safety for themselves, and what they can get from us in the way of scientific advancement. They control a good part of the galaxy. They could wipe us out easily if they wanted. But they don't want to. We are their greatest natural resource. We are their brains." Lura started to protest.

"It's true," he said, ignoring her

interruption. "They have some kind of mental or neural field around them that we don't know anything about save for its effect on us. Within certain distances we are completely unable to resist them, and they can at will get any information from us they want. But their intelligence, though well organized, is not very high. In mental capacity we are far superior to them.

"We perfected space travel, not the podians, although they use it now and it is denied to us. We took them off their dark, damp, cool planet and brought them here. It was an accident that we found them, but nothing thereafter was an accident, though we didn't know it at the time.

"A hundred years after we found them they are grown numerically stronger, and, acting in concert, took over before anyone realized what was happening. And when we were able to see it, it was too late. We tried to fight them, but by then we were confined to this one planet, those of us that were left. To keep us here they used a force field that we ourselves had invented. They had all the power by then, and they used our own weapons against us."

Old Vandergrift paused and drummed his finger absently on the soft, warm, plastic table. "It is important that you get the idea of the patrols exactly," he said. "They could, of course, put a podian beside every man, woman, and child on earth. Then they would be taking no

chance that we would ever succeed in devising a weapon capable of defeating them.

"But they would not get the results they want. After the first generation they would have merely an extension of the podian mind. A larger, more capable extension, but it would have no more imagination than they have. It wouldn't be any better than their own mind. And they know that is not good enough.

"That's why they use what the layman calls the mind patrol," he went on. "The mathematician knows it as the probability patrol. This at once controls us and yet leaves enough freedom that we may hope to overthrow them. Without that hope we could not be interested in scientific progress.

"You don't think," he said bitterly, "that we can supply all of our own economic needs to keep our science advancing? Plastics are plentiful. We make them from the forests which are everywhere around us. We've picked the ruins of our old cities for metal, and we have our own mines. But we still run short of certain metals, especially since there is only air transportation any more. Where do you think we get those metals? Exactly."

He fell silent and resumed eating. But Pawl wanted more information. After waiting for a sufficiently long period he asked quietly, "Now I know why they have the patrols. But I still don't know how they work."

The old mathematician looked up

testily. "Of course. If they sent their ships in a predetermined pattern over the earth they would get—nothing. The bulk of the people would remain in one place, and the research workers would move once or twice in ten years. To avoid this result, they have introduced a random element into the patrol."

"Then it was Hall's idea that these patrols could still be evaded by the proper application of math," Lura ventured timidly.

"Wrong," snapped Vandergrift. "That was Steinberg's idea. Hall merely wanted to evade them in any way he could. The two men worked together, and Hall wrote about their work. It's the old story. The man who popularizes a theory gets all the credit for it. Though don't misunderstand me: Steinberg was in full agreement with what Hall was doing."

"That's what I want to know," persisted Pawl. "What was Hall working on?"

"Who knows?" answered the mathematician sardonically. "He was a great one for telling us what we must do. He said that if we had a little enemy, in ten years we might devise something that could defeat them. A bigger enemy might require twenty years of uninterrupted work. But an enemy that controls much of the galaxy, an enemy that could destroy, not just the earth, but the whole solar system any time they thought it necessary, that enemy might require a thousand years of work.

"But what *he* was doing, he didn't say. All I know is that he was fond of quoting an old biologist whose name I believe was Holt: Heredity is the development of the fertilized ovum in the womb." The white-haired patriarch paused and looked around.

Pawl shook his head. "Let's skip the biology. That's not my field. What about the electronic devices he was supposed to have been working on?"

Vandergrift grunted. "Nobody knows. Nothing was ever found."

"His children took them to the podians," said Lura vindictively.

"You have a fixation on his children," answered her uncle. "I myself have talked to an old man who last saw the children of both Hall and Steinberg. Their parents had just died, and they were on the way to the place they ultimately settled. There were four of them. Two Steinbergs and two Halls. The oldest was eighteen, the youngest was twelve.

"Aside from the clothing they wore, they had only these things: one small hand weapon, a few dresses their mothers had worn, and the pallets they had slept on when they were younger."

"So that proves they didn't take them. But they still might have destroyed them," insisted Lura.

Vandergrift smiled sadly. "Maybe they destroyed the devices, I don't know. But, in any event, there is no

use blaming them for it. I'll tell you why.

"Both Hall and Steinberg paid a lot of attention to their children. They worked with them constantly. And yet they were never able to achieve very much. The children had no conception of the podian role in human affairs; they were never even very bright.

"An autopsy was performed on the two men after their death. One thing was revealed which is not widely known, because we don't like our great men to have defects. Both men had structurally abnormal brains. Brilliant? Yes. But defective.

"Their children, especially in view of their behavior, which was queer, and definitely abnormal, were undoubtedly structural—morons. This is the opinion of the best psychiatrists of their day."

"So it was impossible for them to carry on the work of their parents," Lura said contritely. "And all my life I've hated them—"

"It doesn't matter," said her uncle. He arose and looked at the spool of calculations. "And now I'm going to quote something else to you. A woman named Emily wrote this long ago:

I dwell in possibility

A fairer house than prose.

More numerous of windows,

Superior of doors.'

"Substitute one word, probability, and that describes mathematicians in this age."

"It doesn't quite rhyme," protested Lura.

Vandergrift smiled quizzically at her, and went to the projector. Soon he was deeply immersed in the theory.

The following morning Pawl awakened early, but the mathematician was already working. It was easy to see that he was greatly concerned. "It makes a small but important addition to one factor," he explained. "And that can mean the difference between capture and freedom. I wish I had a faster machine to calculate this position."

He was overjoyed to find that Pawl had such a machine with him. "Their pattern isn't as random as, say, the air molecules in a given quantity of gas. They have limited forces to use and a large territory to cover. So they have introduced modifications; they don't give the same coverage to the oceans as they do the land. No need to."

"What kind of a patrol do they have on the ocean?" asked Pawl.

"They have divided it into zones. On the open ocean, with no islands in it, they have a straight radar patrol, automatic, and very high speed. Many of the small islands they have—eliminated. Where there are clusters of islands they use a combination radar-mind patrol." He chuckled. "I know what you're thinking, but it won't work. Nothing has ever escaped their radar patrols. They can probe down to the bottom of the ocean. By the way, that's why caves won't work either."

He turned back to his calculations.

Pawl looked at the one old man working at the tiny machine. "The podians have a machine a thousand feet square to use," he said hopelessly.

"I know," said the old man, his eyes shining, "but I have two advantages. I am looking for one spot where they won't come: they have to account for the entire earth. They have a better machine to work out their equations on, but I have a more complex formulator." He tapped his head and went back to work.

In eight hours he looked up cheerfully. "Good thing you brought this to me."

"Then we're not safe here," said Lura.

"Sure we are," said the old man. "For about twenty hours. Plus or minus."

Pawl jumped to his feet. "Then let's get out of here. We'll take what we can. The rest we'll have to leave."

Vandergrift smiled. "Where shall we go?"

"Don't you know?"
"I will in about eight hours. No, make it seven. I've got the hang of your machine by now," he said blandly. "I know that this area is going to be isolated and investigated, but I don't know how much of this area. Before we can move, I must find out what areas are not going to be involved in the near future."

He bent over the calculator and began feeding equations to it. "I could use large quantities of black synthoffee. And you two can be load-



ing the skycars with my possessions."

It didn't take long to load his belongings: the microlibrary, the plasto digester and foam sprayer, the large parafield generator, an assortment of hand weapons, the small and primitive synthetic food converter, and the personal odds and ends that accumulate in the course of sixty years.

The hours passed slowly for Pawl and Lura, who could only stand and wait. But in six hours the mathematician was finished, beating his estimated schedule. With a sigh he raised his red-rimmed eyes from his work. "I think I've found a place where we will be safe for some time to come. It's far away, near the Atlantic seaboard." He lifted the cal-

culator into his skycar. "Follow me in your machine."

It took them four hours to get out of the area that Vandergrift considered immediately dangerous. Thereafter they flew more slowly for a long time until they came to a wooded valley near, but not too near, a village. Once they landed the old man stretched out under a tree and almost instantly was asleep.

The house was built by the time he awakened. A few trees were felled with the vibra saw, cut into lengths and fed into the plastic digester, and then sprayed rapidly into the desired form which hardened on contact with air. The basic raw material was all around them.

The old man looked at it appreciatively. "Much fancier than I build myself." He leaned against the wall

and turned to Pawl. "I have been so busy that I haven't had time to ask you! When are you going to the cave?"

"In a few days," answered Pawl. "First I want to rewire your synthetic food converter. You might as well have more variety in your food." There was this task before him, of course.

This, and the extensive alterations to the skycar.

He was both pleased and sorry to leave Lura and her uncle. It was clear to him that he was more than merely fond of the beautiful, indomitable girl. Yet it was obvious that, without a basic solution to the problem which confronted all mankind, any relation he might have with her would come to a sudden and catastrophic end. He was a realist, a product of his age. He questioned the value of a relationship that existed under terror, threatened constantly with involuntary dissolution.

By the time he reached the cave, kept as it was when he died as a monument to Hall, he had stopped thinking about Lura. More out of a sense of dedication than out of hope of learning anything he examined the entire cave.

Then he came back to the big steel cage. Legend had it that Hall had lived in it a week before he died, the insistent summons hammering inside his skull. And besides this cage was another—for his wife. Twenty miles away, in another cave, were two more cells, where Steinberg and

his wife had died at the same time.

Pawl went to the library and inserted the journals into the projector. He sat there until evening, scanning the records of the long dead research man. If there was a clue about his work, it was well hidden.

In the morning he took the skycar up high and headed toward the sea. He flew for hours on robopilot, thinking of the words he had read the previous day:

For nearly twenty years I have been able to elude the invertebrate masters of our world; full credit for this must go to the math of my dear friend Steinberg. I am an indifferently good electronics man, and a fair biologist; therefore I am not really qualified to pass judgment. Yet I think that mathematics can foretell only where the podians will be, not where they will not be. By this I mean that predictability has limitations. We can tell where they will move their main stations, which they do on occasion, in order to get a more variable pattern. We can even project the main features of all their patrols; but we cannot foresee with certainty where every single patrol will be.

And yet men, though giving the credit to Hall, followed the mathematical treatment established by Steinberg.

But there does exist a hiding place where the podians cannot penetrate. Soon my work will be continued there.

But the podians came before he had an opportunity to go there. Where was that place?

In event that I fail, or am prevented before I can act, others must carry on this work. I cannot say more, even in

code. The podians are continually capturing our best scientists and mathematicians. Those helpless men and women, working under the control of the podians, can break any code that I or my friend Steinberg could devise. The solution must be left to the logic of your free minds. By definition, the captives of the podians cannot work satisfactorily in that area.

Pawl gave up thinking about it. Hall could have meant anything. He might have been writing of the same place toward which Pawl was now heading. He might have had in mind an altogether different location. One thing was certain—he did not consider that mathematics offered an ultimate solution.

And, of course, he could have been dreaming, more imbued with hope than knowledge. If Vandergrift was right, this was exactly the case.

By noon Pawl found the Sargasso Sea. He was puzzled. According to his information it should be much farther from shore. It was true, however, that there had been no real study made of the ocean for nearly two thousand years. His charts were out of date.

First he made a survey of the entire area. It was now quite small, considering that it had once extended for vast distances. No matter, it would serve his purpose.

His alteration had made the skycar seaworthy enough for this expedition. In mid-afternoon he landed on the calm, weed-choked surface of the ocean. Carefully he took samples of all the important plant life and

tried to estimate the amount of each.

Was this the hiding place? Podian radar could penetrate to the bottom of the ocean even here. But could it disentangle a properly made submersible from the mass of sargassum in which it floated? Pawl thought it could not. And, unless he was grossly mistaken, this was also the opinion of Hall, the electronics engineer. "Where the podians cannot penetrate."

Small atomic engines were the answer to the power problem. Seaweed could be used in the synthetic food converter. A circle of tiny detection devices, located miles away, could pick up the radar patrol while it was still on the horizon. It wouldn't be necessary to stay submerged for long periods.

In a craft whose index of penetration was equal to the average sargassum it would displace, here in the seaweed, man could be safe.

It was late in the afternoon, and he was still collecting specimens when he heard them. They were too far away to see, but he could feel them pulsing in his temples. He looked up wildly and tried to locate them. Flee. Yes. But where?

His mistake lay in not looking high enough and not properly estimating their velocity. At tremendous speed they came. Flight was not possible. In a long line, spaced at close intervals from horizon to horizon they swept down from the north. He cowered helplessly on the surface, awaiting a deadly beam stabbing downward. Awaiting the lazy drop

of an atomic bomb pin pointing his craft.

But for some incredible reason, neither of these things happened. Miles before the onrushing patrol reached him, the patrol—parted. Some of the ships moved to the right of him, the others crowded to the left. He stared in amazement as they swept past, but not over him.

Far to the south they closed ranks again and swept solidly onward.

For an unknown reason death had passed him by. Sweating and motionless he sat and pondered the strange behavior of the patrol. He knew that his escape had been accidental. It seemed improbable that the sargassum had fouled the radar screens. The ships had been flying over the Sargasso Sea before they broke formation. They had resumed formation, still flying over the same mass of seaweed.

Somewhere, in this particular part of the sea, there was a cause for that inexplicable action on the part of the patrol. Lost in thought he took the skycar up a few hundred feet and hovered over the ocean. Darkness came swiftly now. Expectantly he looked down.

And found the answer.

The sea glowed, but not with phosphorescence; it was illuminated from the depths. Directly underneath him a great craft broke the surface of the water. He did not need a second glance to determine that it had not been made by man. Now it was clear why the radar patrol had avoided

this area. Undoubtedly the podian vessel that had been resting on the bottom of the sea was permanently stationed here.

He slumped wearily in the skycar and tried to evaluate the facts. The sargassum would effectively conceal a small craft submerged in it from the searching beams of the patrol, of this he was sure. But he was equally certain that he could not use this nor any similar area of the sea.

The podians came from a damp, cool, dark world. Even on earth they were not always on duty. And in this part of the sea they could easily approximate the conditions appropriate for their maximum comfort. And that explained, too, why he was so near to them and still had not been summoned. They were not now looking for humans; they were, simply, off duty.

Now that it was night they were coming to the surface. He could hear the sound of water as it gently washed against the sides of the gigantic vessel.

Quietly he took the skycar away. Not that it mattered much. He was hunted now. He had made no discovery which would menace them. But one thing he knew that no other human did—where they spent their leisure. And for that knowledge he was doomed.

He headed for the mainland and landed in darkness on a meadow. He fell into an uneasy, exhausted sleep. In the morning he awakened to see a shimmering force screen in the air.

Given enough power, he knew how

to break through it. But no man had at his disposal the enormous power that the podians controlled. Controlled, but had not invented. This, then, was the end.

Legacy. He thought of Lura. To her I leave my last love and kisses. And tell her not to follow the podians, hoping, in some magical way, to gain immunity from their terrible commands. They will come all too soon to her uncle with whom she is staying. Mathematics alone is not enough.

To the world I give the following. Item: one used skycar, suitable for landing on the ocean. Item: one discredited theory. Item: one piece of useless and dangerous information. Item: hope. I have no use for it any longer.

He sat with back against a tree and waited. And the call came, faint and tenuous, a sticky web that reached out and would not leave once it had found him. He resisted it—the podians must be far away. Calmly he sat and fought it as it grew more intense.

Slowly he got to his feet and started walking. He tried to keep his mind aloof from that dreadful inquisition. "Hideaway," he muttered to himself. But there was no hideaway.

His mind gave way and he walked fast through the forest. He stumbled over a log and scrambled to his feet. Cannot delay them. Must get to them. Hate. What is hate? They are nice.

Now he was running. Run to them. Fly to them. Hideaway. But

the hideaway was a delusion. Or had got lost in dark labyrinths of reality.

And then, unaccountably, he stopped. He did not know the reason, but he did know that he was no longer controlled. The muscles of his legs still twitched spasmodically, but only from the release of tension. The aching compulsion had withdrawn from his nervous system. A stronger field than the podians could create had crashed protectively around him. A clean and antiseptic thing touched his mind.

He stood at the edge of the meadow and stared at the children as they came through the tall lush grass. How many were there? A dozen? But it was not how many that was important. Not how many.

They were ragged and dressed mainly in skins and their hair fell to their shoulders. But they would never be mistaken for wild creatures. The oldest was a boy, who looked sixteen. The youngest was perhaps three. And all of them were calm and unafraid.

They stopped a few feet from him. "Do you know anything about electronics?" the boy asked. Pawl nodded.

"Good," said the boy. "Then you will go with us. There is much technical information we need to know."

"Go with you?" repeated Pawl, looking at the little group. A girl stood possessively beside the boy. She wore a threadbare quilted dress too big for her fifteen-year-old body.

"Yes," said the boy. "Last night

the voice told us to leave our camp near the podian station and go back to the world." Pawl looked at him sharply. Did he see visions, too?

The boy correctly interpreted the expression on Pawl's face. "I believe this is the origin of the voice, though I did not know it before last night." He handed Pawl a small object. "We found it concealed in the pallets on which the children sleep."

Pawl investigated it curiously. It was a miniature but recognizable radio. The boy had said they lived near a podian station. Their ignorance of many ordinary products of an advanced culture was, therefore, understandable.

"We did as the voice told us," said the girl. "We dug this up near the station. No one knew it was there, but we had no trouble finding it." She handed him a plastic covered object, a foot square and half as thick. Pawl took it eagerly. Electronic equipment of any nature was forbidden near a podian station. This must have been buried there before the station was built.

He opened the case and examined it carefully. Slowly his elation vanished. "It is nothing," he said in a flat voice. "It is a radio transmitter, of obsolete design, broadcasting a weak signal from a number of reels of wire recordings."

Somehow Pawl associated the presence of the children with his recent liberation. He looked quickly around. They had no other equipment. "But the field," he said des-

perately, "how did you nullify the field—"

The boy merely smiled, standing there in the glade in the morning sunlight. "The podians create the field within their nervous system," he said gravely. "Did you think that we would use a machine?"

Pawl could not readily grasp the emotional content of that concept. Therefore he busied himself with the scientific aspects.

"It is an old plan," continued the boy. "A plan that had to be kept secret even from those who participated in it until the time came—" He drew the girl gently to him. "Until the time came when a human would be born whom the podians could not command. I was the first such human." He fingered the rotting cloth of the dress the girl wore. "My mother wore this," he said. "Not because she wanted to nor yet because she knew why. A pattern of behavior had been set up which she could not ignore."

He finished. "The ancestors of all of us here wore this dress from the time of conception until each child was born."

Pawl could see a metallic gleam through the tattered and threadbare fabric. There was a circuit of unknown complexity woven into the material.

The parts of the plan fell together in his mind. The podians called and man came to them, in proportion to his knowledge, according to the degree of his hate. But if from birth the

scope of knowledge were deliberately restricted, and if the child were emotionally conditioned *not* to hate the podians, then he would never be summoned. A whole clan so conditioned could live near a station and be tolerated. The devices which the children had brought with them were capable of educating generations of children in this manner.

And when at last one was born who organically created a certain field, he would trigger into activity a new and different system of automatic education for those who came afterwards.

But how was such a child evolved in the first place? Holt had said: "Heredity is the development of the fertilized ovum in the womb." This was at least partly true.

Between the child at birth and the adult there stands a world of growth. Feed the organism and train it properly and you have what you will, within limitations—musician, athlete, scientist. Treat it otherwise, withhold an ounce of iodine, and less than that of other substances, and it will become diseased, crippled, idiotic.

But between the fertilized ovum and the child at birth there stands an incalculably greater universe of development. Here the organism is truly pliable.

The dress which the girl wore contained a circuit which modified

the podian mental field and applied it to the developing ovum. And the growing nervous system of the embryo responded. But there was only one place where a strong and constant field could be assured, and that was near a podian station.

The boy interrupted Pawl's thoughts. "We will hide in the forest until the force screens are lifted." He paused reflectively. "We wanted our parents to come with us. But they could not. They are emotionally conditioned to stay in that one place."

He smiled sadly at Pawl. "To you they would seem like—morons. And so they are, in a sense." He shook his head. "I suppose it was necessary." He led the children into the shelter of the woods. Pawl followed.

"They do not know what happened," said the boy. "They will be lonely and bewildered without us. And they are incapable of having other children."

"What is your name?" asked Pawl, though he knew.

"My name is Sam Hall," said the boy. "Sam Hall the Fifth." He looked at the podian ship which floated over faraway tree tops. And he spoke to that ship and those creatures in it. "May you be damned."

The hideaway was in the process of life itself, in the developing ovum, in the unborn generations. Long ago the first Sam Hall had found it and knew that it would endure.

THE END

THE FRIENDLY MAN

BY GORDON R. DICKSON

He was very friendly — he'd waited a long time to see the man out of time. But his whole purpose was one he'd never realize —

Illustrated by Orban

Mark Torna was very surprised to find someone waiting for him.

The awaiter was a young, pleasant-looking man wearing an open-throated sport shirt with a pipe in his mouth. He took the pipe from his mouth to wave cheerfully and pointed through a doorway into what seemed a rather pleasant living room.

"Come in," he said. "Come in, and make yourself at home."

Wondering, Mark followed him in. This was not according to what he had conceived as regulations. Did they have a reception room for all visitors from time?

He looked around the room wonderingly as he took a chair. It looked like any ordinary room, comfortably furnished in the style of his own century.

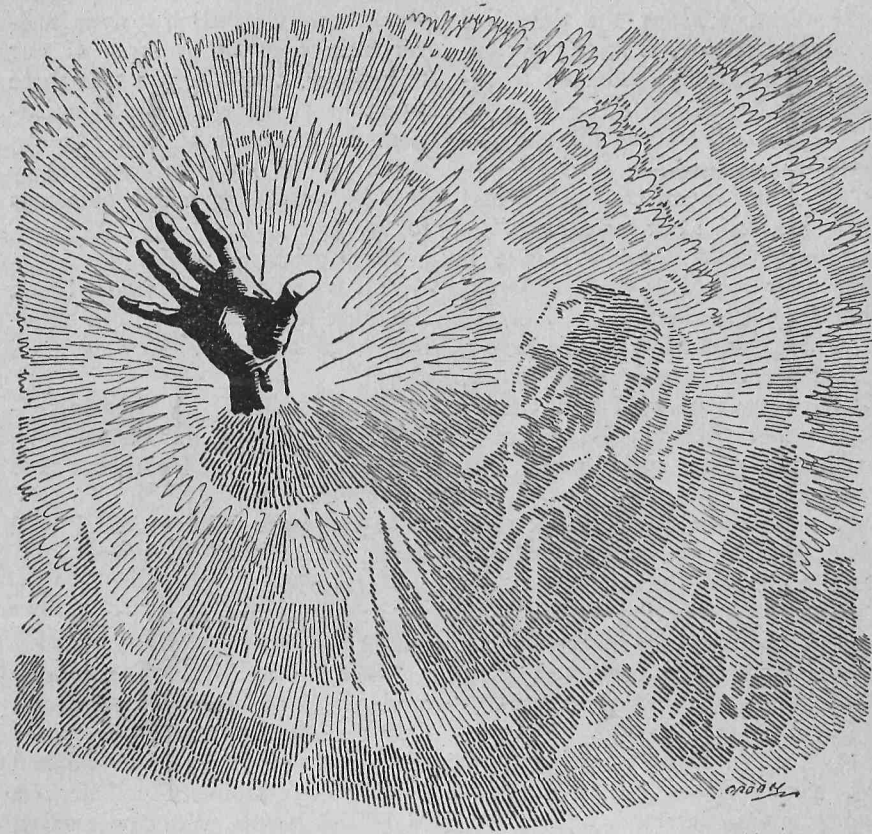
"You look puzzled," said the young man, who had taken a seat across from him—a deep leather armchair in which he lounged comfortably. Mark eyed him narrowly, noting the style of his clothes, which was the same as that of Mark's own.

"I am," he said, dryly. "You don't expect to go fifty thousand years into the future and find the present."

The young man chuckled. "You'd be surprised," he said. "Civilization has a way of coming full circle . . . oh, by the way, my name's Merkl; and yours is—?"

"Mark Toren," said Mark. "What do you mean by full circle?"

"Ups and downs," replied the young man, airily. "Dark Ages—a period of scientific advance—another



Dark Age—another period of scientific advance—and so on."

Mark frowned. "That's odd," he said. "The cycle seemed that way in my time, surely. But according to my own prognostications, it should have leveled out to a steady uphill climb for the human race by at least twenty thousand years after my time. As a matter of fact, that's why I chose to go this far into the future; simply because that time seemed so remote that no one of my time could

imagine what the human race would be like—" He interrupted himself suddenly, "If you don't mind, I'd like to ask a few questions about your present time."

"Shoot!" said the young man, blowing a cloud of smoke towards the ceiling.

"You speak my language," asked Mark, bluntly, "you're dressed as I am. How come?"

"Oh, that," said Merkl. "We have instruments that allow us to look a

little distance along the time line in either direction. We saw you coming and got things fixed up to receive you."

"That much trouble for one visitor?" asked Mark.

"It wasn't much trouble," Merkl shrugged, "with our technology."

"Then," said Mark, "I take it that your world is very different from what I see here."

"Some," said Merkl. "We have a higher technological level, of course. At the same time, as I said, culturally, our civilization is at pretty much the same cyclic point that yours was at."

"At the same time," Mark said, his eyes taking on for a second, the fugitive gleam of the researcher, "it's going to be interesting for me." He paused, and when the other made no immediate response, continued. "You don't have any objection to my seeing it, do you?" he asked.

"Oh, none. None at all," replied the young man hurriedly. "Of course, you understand, we're going to have to give you and your temporal vehicle a bit of an examination, just to make sure there's nothing about either of you that might possibly be harmful to us."

"I assure you—" Mark was beginning stiffly, when the young man interrupted with an apologetic air.

"Oh, we realize that you have no intention of doing any harm, but you might, for example, be harboring disease germs to which we are no longer immune. Your ship might possess some latent energy which

would react violently if it were inadvertently exposed to some of our technology. I assure you that there won't be anything to the examination. As a matter of fact, you can speed up the business considerably just by answering a few questions for me."

Mark grimaced wryly.

"I'd hoped the shoe would be on the other foot," he said. "I'm bursting with curiosity. However, go ahead."

"First," said Merkl, "just to confirm the findings of our instruments, suppose you tell me from what time you come?"

"Twenty-one Ninety A.D.," said Mark.

Merkl nodded.

"And what type of civilization did you have, then?"

"Well," said Mark, "we considered ourselves fairly well advanced. Our rockets had reached as far as the moons of Jupiter and we had fairly well established colonies on Mars and Venus. We were making fairly wide use of atomic power, although the installations were still so expensive as to restrict their use considerably—" he broke off, somewhat embarrassed.

"I suppose this all sounds awfully primitive and childlike to you," he said.

"Not at all," answered Merkl, quickly. "Not at all. Go on."

"Well—sociologically we were, I suppose, pretty primitive. Equality among the sexes was firmly established, of course. There was still

some suppression of minorities, but not much. The old Earth governments were still in force, although the real power was wielded by the large business and labor organizations."

"I see," interjected Merkl. "Still the type of society where a strong man could hack his way to power."

"Why, yes—" said Mark, and stopped abruptly. "Why do you ask that?"

"Oh, for no particular reason," replied Merkl, easily. "The situation is merely typical of such cyclic conditions as you've been describing. Tell me more about the extent to which planetary exploration had gone. No farther than Jupiter, you say?"

"Not that I know of," answered Mark. "And I imagine I would have heard of any further advances."

"Interesting," said Merkl. "Very interesting." He rose suddenly to his feet.

"I'll leave you now," he said. "The machines are ready to scan you and your machine. The process will take several days, but I assure you, will not cause you the slightest discomfort. Make yourself comfortable here. This building is yours, although I must warn you about stepping outside of it until you are told it is safe to do so."

"Of course," said Mark. "But there are a few more things I'd like to ask you—" He broke off, for Merkl had already passed through the door and was gone.

After the young man left, Mark sat for a while in thought. The reception he had been accorded was not what he had expected—but then he chided himself for expecting it to conform to any preconceived notions.

He was not the first explorer in time to leave from the period of the Twenty-second Century; but if he returned, he would be the first to do that. The risk was a calculated one, and he took it with no mental reservations. It was, however, with some idea of playing safe that he had set his destination at five thousand years in the future. Briefly, Mark had been hoping to get beyond the cyclic ups and down to which Merkl had referred. Inevitably, he had thought, reverses and re-reverses of history must come to an end eventually as man grew in mental maturity.

How far can the human race go in fifty thousand years, considering its progress during the past five thousand years of known history? Mark had asked himself that question and answered it with the obvious reply that it was impossible to imagine the answer. The most he could guess was that by then man would be a new creature entirely, bearing only the remotest resemblance to his ancestor of the Twenty-second Century. The least Mark had imagined was that man, fifty thousand years from then, would have passed into a completely new era.

And now, here was Merkl to tell

him that, aside from a greatly improved technology, man was still on the same merry-go-round of history that he had been on in Mark's time. Mark shook his head over the information. Merkl's answer was plausible, even reasonable, but it did not *feel* right.

Mark shook the notion from his head and rose to explore the building where he was being temporarily held a prisoner. It consisted of three rooms and all the appurtenances of the normal Twenty-second Century bungalow. The only difference was a stairway that led up to the open roof, which gave him a view of the surrounding country.

The countryside was grassy and rolling; the air astoundingly fresh and clear, so that the few isolated groups of buildings he could see in the distance stood out sharply, like meticulously executed miniatures. He was struck by the isolated position of his bungalow, and had half-way resolved to ask Merkl about it, when it struck him that possibly they were playing extra-safe in the matter of possible contagion. Still, that was odd, when Merkl had not seemed at all shy about coming into quite close proximity to him. Of course, the scientific worker sometimes took long chances— He shrugged his shoulders and went back down the stairs. I'll just check the time machine, he thought, and then get some sleep. As soon as the examination period is over there'll no doubt be plenty to do.

But when he came to the spot of

his arrival, the time machine was gone.

Two days later, Merkl returned. Mark did not hear him enter, but there he was, suddenly, in the entrance to the room where they had had their first interview.

"Hello," said Merkl, with a friendly smile. "How are things going?"

Mark jumped out of his seat.

"You've taken my machine!" he snapped.

"Why, yes," said Merkl. "It was easier to take it to the machines which would scan it, than to bring the machines here. I imagine you'll have it back in a day or so."

"Oh," Mark answered, somewhat mollified. Merkl came on into the room, followed by an older, thinner man, who nodded pleasantly to Mark.

"Mark," said Merkl, "I'd like to have you meet Termi, one of our archaeologists. He's one of the group who's been studying that machine of yours; and he's found it interesting. So interesting, in fact, that he wanted me to ask you if you wouldn't mind chatting with him about it."

Mark could not help feeling slightly flattered. The thin line of his mouth relaxed.

"Of course," he said. "Anything you would like to know."

"Thank you, - sir," responded Termi. "Shall we sit down?"

All three took chairs, and Mark leaned forward, grasping his knees with his hands, in an attitude of at-

tentiveness. Termi's smooth voice flowed over him.

"I must begin by an admission," said the archaeologist. "Our records of time machines are very incomplete, Mark, very. The most primitive ones of which we have any record belong to a date some fifteen thousand years later than your time. We assume that probably there was, following your time, a period of scientific retrogression, in which the basic knowledge necessary to the construction of such a machine, was lost. So that your machine stands alone in our experience without any means available to tie it to later developments. It is not even readily apparent to us how you operated it; and I thought, just to save us the time and effort of experimentation, that you might not mind explaining the process to us."

"Not at all," answered Mark. "You must, of course, understand that there were others working on the subject of time travel during my period and that my machine is by no means typical. But they were all founded on the same principles.

"Briefly, it was the development of psychomechanics that allowed real research on the subject of time travel to begin. Psychomechanics found that there was a definite connection between the human body's perception of time and its *experience* of time. That is, the body tended to react to what it perceived as a speeded-up time flow by speeding up itself. The Mackenwald distorter was the first instrument to exploit

this reaction by accelerating a subject's perception of time as much as three times normal; and, quite by accident, it was discovered that inanimate objects in close proximity to the body also tended to be affected by the speed-up process.

"From the matter of distorting the body relative to time, it was a short step to the problem of distorting time relative to the body. And from the research done in that direction finally was evolved the technique of putting the body in suspension relative to time—that is, into a timeless state.

"It's a little difficult to explain what I mean without demonstrating the processes as they occurred step by step. But, it should be easy to understand how, once it was possible to put a living person into a timeless state, all that was necessary for time travel, was to find a means of moving that body along the time stream to the point at which it wished to re-enter the time stream. Psychomechanics solved that difficulty by training the human mind to the point of using it as a propulsive unit in the timeless state. This, of course, was possible since it takes, even in practice, almost no energy to move a body relative to the time stream."

Termi leaned back in his chair and laughed.

"No wonder," he said. "That's a good joke on us. No wonder we couldn't find any evidence of a propulsive unit on your machine, when the propulsive unit was in your head, instead."

"Well," said Mark, a trifle embarrassed. "It's something like that."

"Well, well," said Termi, standing up, "thank you for being so kind as to explain it to me, Mark. Sometime later I'll have to drop back and have another chat with you. There are a lot of aspects of your time on which I'd be glad to have some firsthand information."

He turned toward the door. Merkl also rose to go, but Mark put out a hand to detain him.

"Look here, Merkl," he said, "aren't you through with investigating me, now? I'd like to get out of here and see firsthand what this world of yours is like."

Merkl stuffed his pipe thoughtfully.

"As a matter of fact," he said, "you seem to be turning out to be a more complex character than we had expected, Mark, and we're not quite done, yet. I imagine that in a week more, you can get out and around."

"A week!"

"Possibly a week," answered Merkl. "Possibly less. And now I really must go." And, wrenching his arm from Mark's grasp, he turned and was through the door before Mark could think of anything more to say.

Mark jumped to the door behind him, and flung it open. But there was nothing to be seen except a small sort of flying ship rising from the grass just outside the building. Dejected, Mark returned to the interior of the bungalow.

The week passed, leaving Mark with food for thought. The bungalow was supplied with books of the Twenty-second Century type, but, on close inspection, Mark was unable to find one that he had not read before. So he spent his time mostly on the roof of the building, enjoying the sunlight and pondering the reception that he was receiving in this world of the future.

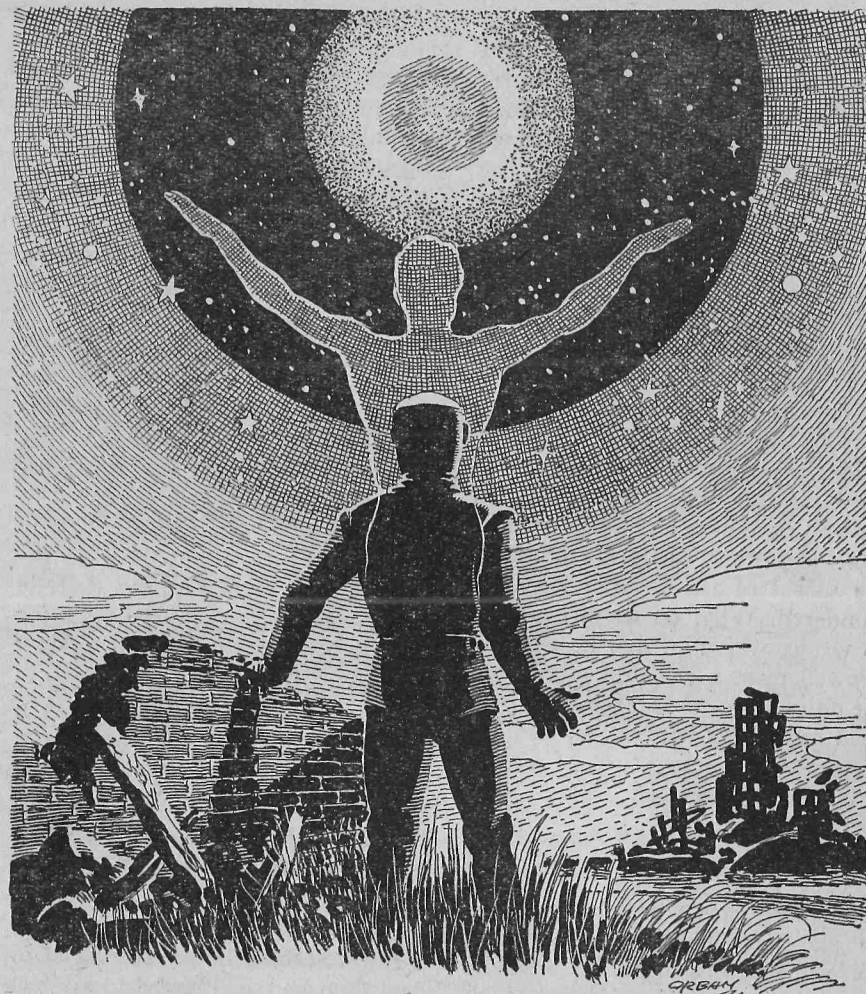
It was not until the week was nearly over that he was able to put his finger on the oddness of his situation—the feeling that had been bothering him ever since his arrival.

It had to do with the reactions exhibited by Merkl, Termi, and the race they represented. Subconsciously, Mark had expected these men of the future to be, if anything, supremely sure of themselves and their actions. And it was a lack of this sureness that he seemed to notice in the two men he had met so far.

He had assumed from the completeness of the building in which he found himself and the casual attitude of Merkl that they had been completely prepared for his arrival. Consequently, he had reasoned that there would be little fuss and bother about the investigation to which they insisted on submitting him. Instead, there seemed to be a great deal. It was puzzling.

Consequently, when Merkl next returned, at the end of the week, Mark was determined to pin him down on the matter of his further seclusion.

"Look here, Merkl," he said, "I'm



not questioning your right to take adequate defensive measures against whatever inimical hosts my mind or body may be harboring, but you can't keep me shut up like this with nothing to do. I'll go crazy. Man, I'm human, too."

For some reason Mark's words seemed to catch the other completely off balance. He continued to stand facing the visitor from time, with his usual smile and puffing with his usual serenity on his pipe. But otherwise it was exactly as if a switch in

his mind had been clicked off. He stood, staring at Mark for such a long time that Mark grew alarmed, thinking that the man had been struck by some sudden strange paralysis. Then, just as suddenly, he came out of it.

"You must stay here," he said. "It is impossible for you to go out right now."

"But—" cried Mark.

"I'm sorry," said Merkl, and, turning on his heels, fairly ran out the door to his waiting flier.

Mark, puzzled and angry, paced the bungalow after Merkl had left. He had no longer any doubt that he was being deliberately cut off from the world of the future. Why, he wondered. What on earth could be so wrong with him that he was not allowed even a close-up glimpse of the cities he could see from the roof? And out of his frustration, and the temper-wearing pressure of nearly two weeks enforced idleness, he formed a plan.

That night he crept up on the roof, being careful to allow no light to show. A half-insane plan had formed in his head. They had warned him against going out of the building, but the front door was unlocked. He assumed that if they expected him to leave against orders, they would not expect him to go to the trouble of dropping off one side of the roof, rather than walking directly out the door. At any rate, he would chance it.

He slithered over the roof's low railing, hung by his hands for a second, and then released his grip. He fell, but not hard, and, after rolling over a couple of times in the soft grass, lay still and waited.

There was no alarm. After a while, he got to his feet and moved softly off through the night to where the nearest city gleamed against the night sky.

He had estimated that the city was some eight or ten miles away, but after trudging for three or four minutes, he was surprised to see that the glow of its lights was considerably stronger, so that it appeared to light up half of the sky. Cautiously he slowed his pace, but the glow increased with such rapidity that he finally had to drop into the grass for fear of being seen outlined against the sky.

He crept forward. There was a small hillock in his way, and for a moment this blacked out sight of the city. Then, he reached the top of it, and looked over. The glare hit him full in the face and he gave a sudden cry of animal fear.

For the city was only a model.

For a second, he lay staring at it. And then he had jumped to his feet and was running down upon it. Its miniature buildings towered to his chest, and the tiny streets were just wide enough for him to walk through. Unbelievably, he ran his fingers over the structures. They were complete in every detail; little masterpieces of imitation. But it was

not just that that set his mind reeling.

It was the fact that every one was a model of some building in his home town. Each one was a replica of a structure he had seen and known. Not one was unfamiliar.

Trembling, he lifted his eyes from the city. Beyond it trembled a shimmering haze on which his eyes refused to focus. Wonderingly, he moved toward it.

It hung, like a curtain of mist, just beyond the farther limits of the city. He strode up to it, stood in front of it, and cautiously extended his hands out and into it.

It gave without resistance and his hands plunged through, disappearing from sight. With a wordless cry, he jerked them back and looked at them in the reflected light of the city. They were whole and good. He stood for a second more, gathering his nerve, and then, taking a deep breath, walked through the curtain.

His feet passed from soft turf to solid surface, the mist thinned before his eyes. He brushed the last of it away with one hand and saw—desolation.

He stood on a street where giants might have walked. And on either side towered buildings. Not miniatures, these, but mighty edifices that towered up until they were lost to sight in the night sky. But there was no light here, and no movement. The fact was written on the dust of the street, in the blank and staring windows of the buildings.

The city was deserted.

Fear returned to Mark Toren with redoubled force. He felt lost and insignificant, like an insect upon the windowpane of eternity, about to be squashed by the thumb of a god. And he burst into wild, unreasoning flight down the street.

After some distance, he obeyed the impulse to hide, and darted into the open doorway of one of the buildings.

"Greetings!" boomed a deep voice.

He leaped backward in sheer panic to the street outside. The voice ceased. He turned and darted wildly for another doorway and slipped inside.

"Greetings!" boomed a voice, again.

He took a step backward, but this time curiosity in part conquered fear, so that he stayed where he was, flattened against a wall, in the shadows.

And the voice went on talking. Only this time he realized that the words were not impacts of sound on his ear, but welled up unbidden, within his mind.

"Greetings, visitor," came the words. "From wherever you have come, no matter what far-flung star-born world may be your home, greetings. You stand at the birthplace of the human race.

"This was our breeding place—this earth. Here we lifted our heads from the earth. Here we stood upright and walked. Here we grew and reached out to the stars. And here

we have left our memorial of the last men to be planet-bound. Look about you and see. The heritage of the human race is here.

"Now we, the last men to be planet-bound, have finished our memorial and go to join our brothers between the stars. We do not go to some other home, for we will have no other home. We have passed beyond the need of home, and all the reaches of stellar space are the same to us.

"For it was never ordained that man should cling to the small bodies of planets when the endless regions of the ether are his to wander in, as a bird might wander in the sky, winged and armored by the power of his mind.

"So, to you, visitor, greetings. Look on the works of man; his buildings, his machines, and the creatures of his machines. All this he has left, as you will one day leave your works and all that your hands have wrought for the greater freedom that comes between the stars."

The voice ceased, and Mark turned from the doorway, into the moonlit street again—and stopped. Waiting for him, rank on silent rank were Merkl and Termi, and others like them, although the others glinted, gaunt and bright in the moonlight without the kindness of artificial flesh to cover their metal bones. They said nothing, and their eyes glittered on him. And Mark knew that he should feel frightened, but the voice inside of the building

had drained fear from him and he felt only pity for the ones before him.

"So," he said, finally, "you are the creatures of the machines."

"Yes," the answer came like a sighing wind from the crowd.

"And I am a man," said Mark. The pity inside him welled up and he asked gently: "What were you trying to do? What did you hope to learn from me?"

"We were trying to learn life," answered Merkl for them all. "We are Earthbound because, while we can think, we have no imagination. Man's imagination has taken him between the stars. We thought if we could learn to go back to the time when Man was still learning, we could learn, too."

"But," said Mark, "you could not use my machine unless you had imagination. The use of psychomechanics requires it." They did not answer.

"But why didn't you just come out directly and ask me?" asked Mark. "And why did you hide all this"—and his arm swept out to indicate the buildings—"from me?"

"Because we hate you," said Merkl unemotionally. "You are something we can never be and so we hate you."

"But you haven't harmed me—" began Mark, bewildered. And then the realization struck him. "You cannot harm me," he said.

"We cannot harm you," said Merkl. "Therefore we hate you."

There was a long silence. "I'm sorry," whispered Mark,

"but I can't do anything for you."

"No," said Merkl, "you can do nothing for us. And we can learn nothing from you. The building in which you stayed was a gigantic scanner. We have analyzed you. We have read you like a book and we do not understand you. We have taken your machine to pieces—down to its component atoms—and put it back together again. But we cannot operate it. Now, we only want you to leave." He lifted his hand, the crowd parted, and Mark saw his time machine standing in the midst of them.

"We cannot travel in time," continued Merkl, "but there are machines here which can block off time from our period to yours. We will use them when you are gone. We

have learned from your visit that it is not a good thing for your kind to meet ours. Now, go."

Mark stepped forward as if in a dream and walked to his machine down the waiting corridor of the friendly men. Without a word, he stepped inside it and lifted his hand to the controls. Then, some inexplicable emotion made him turn, and he looked once more at Merkl, who was standing beside him. Beneath his feet, the generators began to warm up with a humming sound.

"Robot," said Mark, almost wonderingly, staring at Merkl.

The mists of a vanishing time began to swirl up between them. Through the haze he saw the plastic face of the other strangely distorted.

"Don't curse me so!" cried the friendly man.

THE END

THE ANALYTICAL LABORATORY

We are pressed for space this issue, so I simply present the figures:

November 1950 Issue

Place	Story	Author	Points
1.	The Truth About Cushgar	James H. Schmitz	2.76
2.	Tools of the Trade	Raymond F. Jones	2.92
3.	In Value Deceived	H. B. Fyfe	3.38
4.	Follower	Eric Frank Russell	3.46
5.	Quixote and the Windmill	Poul Anderson	3.66

THE EDITOR.

AS QUICK AS A THOUGHT

BY EDMUND C. BERKELEY

They say that any mathematical process can be done by simple arithmetic — if you can add, subtract, multiply and divide fast enough. And that's where the computing machines begin to shine. They can't think, but they can juggle numbers!

Note: Some of the information in this article is taken from a book by the author entitled "Giant Brains or Machines that Think," John Wiley and Sons, 1949, and is used by permission of the publisher.

Thinking is done by men, some animals, and some machines. A dozen years ago, unless we were then readers of science fiction, we might not have included machines. But today there exists in hardware at least fifteen giant mechanical brains busily engaged in thinking.

For the purpose of discussing the speed of thought, man is unquestionably superior to other animals. So the contest of speed lies between man and the machine. There are a number of events in this Olympic track meet, and it will be interesting and entertaining to sit in the grandstand a while and watch the events.

SPEED OF THINKING

Of the many characteristics of thought — acts of thinking — speed is one of the most important. Often the opportunity to make use of an answer to a problem depends on how soon

we can think out the answer.

In college, the superiority of a bright student over a dull one is often merely a faster rate of intellectual work. One student can master a chapter of a textbook in an hour; another requires three hours. Under the pressure and distraction of college activities, the student with a speedy mind has an overwhelming advantage.

In business management, there are often problems where the solution must be found within a certain time to be of any use at all. For example, a mail order house may distribute its catalogue in advance to a five percent sample of its customers, in order to predict its stock needs from the sample response. Probably a week will pass before the first orders arrive, and the orders that come in more than four weeks after the sample was mailed are likely to be of little use in guiding business decisions. Conclusions must be drawn as rapidly as possible from results as they arrive in the first three weeks. But the behavior of customers differs from

week to week. Responses at Time 1 are apparently not a very good indicator of responses at Time 2. Consequently, the least possible time should elapse between the sample mailing and the full mailing. But to shorten the three weeks' sampling period puts even heavier pressure on the staff who analyze and interpret the sample.

In science, particularly military science, speed in solving a problem becomes vital. The frontier of speed in mechanical thinking is now being pushed forward expressly in order to solve the problem of defense against guided missiles traveling faster than eight miles a minute. In the last year of World War II, no defense was found against the German V-2 rockets that fell on England. There was then no mechanical brain fast enough to direct an intercepting missile against them. Work now going on in this field offers a hope that the problem can be solved with machines that may reach a speed of ten thousand multiplications or one hundred thousand additions a second.

Correctness of thinking might be considered more important than speed. But if we increase the speed by a factor of three or four, then we should be able to repeat the thought process all the way through, compare the two processes step by step for correctness, and still have a margin of time to spare.

THE PROCESSES OF REASONING

The purpose of a human or mechanical brain is reasoning, thinking.

What do we mean by reasoning?

Essentially, reasoning means handling information: receiving information, operating with information, and transmitting information. This is the basic function of a human or a mechanical brain. For example, I may wonder if a steam pipe is hot. I touch it lightly and quickly. After I have drawn my hand away, a sensation registers somewhere inside that the pipe is hot or not hot. With that information I can decide, perhaps, whether or not to bang on the pipe to ask for more heat. But if I am not expecting the heat of the pipe, if I take hold of it, and it is hot, I shall be burned—my sensation of heat and my jerking-back reaction are not so fast as the burning of my hand. In both cases my brain—including my nervous system—is receiving information, operating with information, and transmitting information. In the first case, a meditated or conscious action results, and in the second case an unmeditated action. The second case is, in addition, a good illustration of insufficient speed in solving a problem.

What do we mean by information? The simplest and smallest piece of information is a "yes" or "no," like "hot" or "not hot." This basic unit of information commonly occurs as a report about a fact or a statement. The unit of information may appear as a "yes" or a "no," as 1 or 0, as the presence or absence of something, as black or white, as good or bad, et cetera. A decimal digit, 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9 is equivalent to more

than three but less than four of the basic units of information. Three basic units of information can give rise to eight patterns as follows:

Yes, yes, yes	No, yes, yes
Yes, yes, no	No, yes, no
Yes, no, yes	No, no, yes
Yes, no, no	No, no, no

These three units are not enough to represent ten indications; but four units are more than enough for ten—they give sixteen patterns. For many purposes a decimal digit is a convenient unit for counting amount of information.

How do we manipulate information? First, there must be some equipment which can receive and store information for convenient handling. For example, in the human body, the information-handling equipment consists of nerve cells, whose number has been estimated at more than ten billion. This is far more information-handling equipment than even the biggest existing mechanical brain has. Perhaps the most common information-handling equipment outside the human body is pencil and paper. This is fine for many purposes, but it is not very speedy and cannot be manipulated automatically.

When we have postulated some physical equipment for reasoning, we can consider various reasoning processes. What are those processes where speed is concerned?

Many classifications of reasoning processes have been made. But we can group into five rather broad

processes most reasoning of a human or mechanical brain where speed is concerned. These main processes are: reading, writing, arithmetic—including logic, et cetera—the performance of routines of steps, and hunting.

READING

Most people read a book at a rate between two hundred and six hundred words a minute. In the mechanical brain Eniac, a number of ten decimal digits is read from one register to another in one five-thousandths of a second. What is common to both these instances of reading? In both cases, the pattern of information in one register—paper or electronic tubes, respectively—is being transferred into another register—optical nerves or electronic tubes, respectively. In both cases, at the time we start the operation, the first register is completely accessible—we are not required to do any locating of that register. This is the definition of reading, when expressed in a language common to the human brain and the mechanical brain.

Now what is the speed of various reading devices? The speed of any device varies a good deal according to circumstances, and even one significant figure is hardly justifiable. Let us take as a unit task for measuring reading speed, the time for reading a number of ten decimal digits out of a completely accessible register. In the jargon of the automatic computer men, this is the *access time* of a number of ten decimal digits in a register of *rapid memory*.

Following is a scale of the speed of reading performed by various devices:

SCALE OF SPEED OF READING (Roughly Approximate)

Unit task: Reading a number of ten decimal digits out of a register

Device	Seconds
1. Eye reading printed record	0.4
2. Relays	0.03
3. Magnetic drum	0.002
4. Mercury tank	0.0003
5. Electronic tubes	0.0002
6. Electrostatic storage	0.00001

Let us for example check the first entry, the speed at which a human being can read a ten-digit number. A high reading speed of six hundred words a minute at five and one half characters a word is thirty-three hundred characters a minute or fifty-five a second, or about five ten-digit numbers a second. Actually, there are few human beings who could *read* five ten-digit numbers a second; so let us cut down this speed somewhat, say by half, and thus estimate the speed at about two and one half numbers a second, or 0.4 seconds for one number.

A *magnetic drum*—device Number 3 mentioned in the scale—is a rotating cylinder with a magnetic surface. It may for example be six or seven inches in diameter and turn at a speed of sixty or one hundred twenty revolutions per second. A few thousandths of an inch distant from the surface of the drum are small electromagnets. They respond by a tiny surge of electric current to the presence of magnetized spots here and there on the surface of the drum.

This device is the rapid memory in the Harvard Mark III mechanical brain.

A *mercury tank* is a tube or box ranging six inches to three feet in length, usually, and filled with mercury, and having thin quartz slabs on the sides or at each end. A pattern of electric pulses arriving at the front end of the tank causes the quarts to oscillate by the piezoelectric effect; accordingly, a pattern of waves travels down the length of the mercury tank and makes the quartz slab at the other end vibrate; these vibrations are detected, converted into electrical pulses, reshaped, and returned to the front end of the tank. In this way we have storage of a pattern of pulses, a type of memory in motion, called *dynamic memory*, like an echo across a valley. This type of rapid memory has been included in the mechanical brain Binac.

An *electrostatic storage tube* is like a large television tube with a special screen two to six inches in diameter across the end. On this screen charges of electrons may be momentarily stored, like heaps of little marbles, here and there in a pattern of "heap" or "no heap." This type of rapid memory is being constructed for the mechanical brain Whirlwind being built at Massachusetts Institute of Technology.

According to the scale of reading, the speed of a human thought is very slow, on the order of twenty-five thousand times slower than the same thought in the fastest of mechanical brains now under construction.

WRITING

When we take a pencil and write by hand as fast as we can, copying something that has just been placed in front of us, we may succeed in writing at the rate of thirty or thirty-five words a minute. Allowing five and one half characters to a word, this speed is about one hundred eighty characters a minute, or about three characters a second. But a slightly slower speed will apply to digits, since they require lifting the pencil between figures, and so it may take about four seconds to copy a ten-digit number. This is the slowest speed on the Scale of Writing:

SCALE OF WRITING SPEED

(Roughly Approximate)

Unit task: Copying a number of ten decimal digits

Device	Seconds
1. Writing with fingers, pencil, and paper	4.0
2. Fingers typing	1.5
3. Electric typewriter typing automatically	1.0
4. Punch card tabulator printing	0.05
5. Electric darkening of moist chemically-treated paper (facsimile paper)	0.008
6. Recording on magnetic tape	0.0002

The first degree of mechanical assistance is the typewriter. With it, we gain a factor of two or three in speed. The world's typing record is about one hundred fifty five-letter words a minute, but most good typing is done about sixty or seventy-five words a minute, or six or seven characters a second. About half this speed would be realized hour after hour in the typing division of a business.

The IBM electric typewriter, attached to the IBM Automatic Sequence Controlled Calculator at Harvard for printing its output of figures, can type at a maximum rate of about eight to ten characters a second. A recently finished Underwood electric typewriter gives promise of typing at a maximum rate of sixteen to twenty characters a second; whether or not this can be sustained, and under what conditions, has not yet been determined.

The punch card machine known as the *tabulator* makes use of a different principle, by means of which it can type a whole line of characters at once. This machine is equipped with high vertical *type bars*, each holding forty movable slugs in sockets. On the front of the slugs are the characters A to Z, 0 to 9, and four spares. The rear of each slug can be struck by a small hammer. There is one of these type bars for each of a maximum of eighty-eight *writing points*, or positions across the page where characters may be printed. Punch cards or counters in the tabulator determine a whole line of typing at once; each type bar then rises the appropriate distance, according to the character to be printed; the little hammers strike the movable slugs in the type bars; and a line of typing is printed in one stroke. These strokes can occur as often as every two-fifths of a second. The eighty-eight positions are never all filled with characters—spaces are necessary between words and between numbers—but a tabulator is capable of

printing a maximum of two hundred twenty characters per second. This is better than the typewriter by a factor of twelve or fifteen.

Both these machines are delayed by the time necessary for positioning some device in each column of the line of characters to be printed, and research is now going on aimed at avoiding this delay. A possibility that often has been considered is the principle of "a page at a time." This would require: (1) a set of lines or dots of such a nature that a selection of them will give any character to be printed; (2) one such set for each writing point, or possible location of a character over the page; and (3) a method for printing, i.e., transferring the arrangement of the set of lines or dots onto the record with the least possible mechanical motion. For example, if we had only two characters and they were 3 and 8, then our set of lines would be obtained by dividing 8 vertically into two halves. To print 3, we would use the right-hand half only, and to print 8 we would use both halves.

One of the promising methods for printing is the use of *facsimile paper*. This paper registers the passage of an electric current by darkening; the paper is usually moist, sometimes dry. The speed limitations here are the duration of the current needed to darken the paper, and the speed at which paper can be fed through the machine. With the writing points contained in two or three lines, it has been estimated that the speed of this process might reach one thousand or

one thousand five hundred characters per second.

In all these cases, information is being transferred out of the system into a permanent record, which can be separated from the system for a short or a long time. This is the definition of writing, expressed in language common to the human brain and the mechanical brain. In the case of punch cards the form of the output record is such that it can be reinserted into the system without translation again into machine language. It is often desirable to have a form of output that can be put back into the mechanical brain. A new medium of this kind which gives great promise is *magnetic tape*. This is made of paper or metal, coated with a magnetic surface, or plastic impregnated with magnetic particles. Experimental work now going on indicates that at least five thousand decimal digits a second can be recorded in magnetic tape a quarter inch wide.

According to the scale of writing, the speed of human writing is on the order of twenty thousand times slower than the fastest of present mechanical devices.

ARITHMETIC

Suppose I should ask you to add two ten-digit numbers, such as 3,577,641,028 and 8,912,396,447. How long would it take you? If you wish, first copy the two numbers down one under the other, and then time yourself, from the split second when you actually start the addition. It

will probably take you about ten seconds.

Now if we count all the minute steps carried out, we find an unexpectedly large number of steps. For example, in the first column at the right, we read 8 and 7, we recollect the sum of 8 and 7, which is 15, and we put down the 5 and carry the 1. In the next column, we read 2 and 4, we recollect their sum, which is 6, and with 1 to carry, we count forward to 7; we put down the 7, and have 0 to carry. The total number of steps is fifty-seven; they consist of twenty acts of reading digits, ten recollections of results from the addition table we learned in grade school, ten acts of carrying 1 or 0, six acts of counting forward in the case of carrying 1, and eleven acts of writing down a digit. At an average rate of about one-fifth second for each of these fifty odd actions, we need not be too ashamed of the speed of our mental processes.

But how fast are the mechanical brains? Following is a scale of speed in Arithmetic:

SCALE OF ARITHMETIC SPEED (Roughly Approximate)

Unit task: Adding two known numbers of ten decimal digits and storing the result

Device	Seconds
1. Human being, pencil, and paper	10.
2. Relay computer	0.2
3. Human being and desk calculating machine	0.1
4. IBM Electronic Selective Sequence Calculator	0.008
5. Eniac	0.0002
6. Certain planned mechanical brains	0.00001

Some of the planned mechanical

brains are scheduled to do additions at the rate of ten to a hundred thousand additions a second—almost a million times faster than the human mind with pencil and paper.

Arithmetic, of course, is more than just the addition of numbers and in the special sense of computing used here it also goes beyond multiplication and division. Arithmetic—computing—also includes logical operations such as comparison, choice, selection, sorting, matching, and merging; but we shall not attempt here to make comparisons for all of these arithmetical operations.

According to the scale, the speed of a human being at arithmetic is on the order of one million times slower than the fastest of presently planned mechanical brains.

ROUTINE

If a mechanical brain were set to calculate an income tax, all the instructions and rules written on the tax blank or elsewhere would be translated into a long *routine* or sequence of standard commands in machine language. The standard command, for example, of the IBM Automatic Sequence Controlled Calculator at Harvard is "Transfer a number out of register . . . ; transfer a number into register . . . ; and perform operation—" This command repeated over and over again with different insertions is sufficient to carry out an enormous class of problems. In fact, almost any type of reasoning process can be performed by this mechanical brain; it is, how-

ever, impractical for work that it would take excessive time to do.

Routines will contain branches or forks, like those in a road. It is then necessary for the brain—either human or mechanical—to make a choice of direction. Regularly, the brain is instructed with a rule so that when some indication has been determined the brain inserts the indication into the rule and comes out with a choice of direction. For example, in an income tax calculation, one of the choices often made is whether husband and wife will file a joint return or file separate returns. It is less work to file a joint return; it may save money to file separate returns. So a careful family will calculate the tax both ways, and whichever results in the least tax they will choose, and file accordingly.

To measure the length and complexity of a routine, it is natural to list the types of operations that appear in it and count the number of each type. Depending on the type of work, of course, the proportions of the types of operations will vary. At one time at the Harvard Computation Laboratory many routines used on the IBM Automatic Sequence Controlled Calculator were analyzed, and it seemed that roughly the proportions were about one multiplication for every ten additions, and about one division for every fourteen multiplications. In this machine, a subtraction, choice, comparison, or selection, in most cases, takes about the same time as one addition. So in order to measure roughly the speed

of performing routine in different mechanical brains, we have taken as a unit a sequence of ten average operations, and we have assumed that this sequence would take as long as nine additions and one multiplication. Following is a scale of the speed of routine:

SPEED OF ROUTINE

(Roughly Approximate)

Unit task: Carrying out a sequence of ten average operations with numbers of ten decimal digits

Device	Speed
1. Human being, desk calculating machine, paper, and pencil	100
2. Relay computer	2
3. IBM Electronic Selective Sequence Calculator	0.08
4. Eniac	0.005
5. Certain planned mechanical brains	0.0001

According to the scale, we can see that some of the planned mechanical brains will function about a million times faster than the human being even when he is helped with a desk calculating machine.

HUNTING

By *hunting* we mean searching for information in a "large" file of ordered information and finding it according to some system. For example, if we want to find the telephone number of Samuel B. Jones, we hunt in the telephone book. We turn pages by the handful until we reach J; we then turn pages a few at a time until we reach several pages of Joneses; then we turn pages one by one and look down the pages until we find Samuel, Samuel A., Samuel B.; we then start scanning by ad-

dress, running through the Samuel B's—Samuel Baylis, Samuel Boyce, Samuel Bronson—and we suddenly find Samuel Bunsen Jones with the right address, and we read his phone number—ALgonquin 4-7675. We can speak of this procedure as having five *dimensions of access*.

Can any existing mechanical brain do this? No. Why not? How much of this can a mechanical brain do?

There are several requirements that must be met before a mechanical brain can do hunting of any magnitude. In the first place, the information we enter the file with must be expressed in machine language. For example, the mechanical brain which is the automatic dial telephone system can understand a series of clicks. We go to a dial phone not with the name Samuel B. Jones, but with the machine language AL 4-7675, and dial that; the characters are converted into a series of thirty-six clicks, a succession of interrupted electric currents grouped 2, 5, 4, 7, 6, 7, 5; and then we hear Mr. Jones' phone start ringing. In the second place, mechanical brains so far built do not generally have a capacity to store more than a few thousand numbers. The only one that can store as much as forty thousand ten-digit numbers is the IBM Electronic Selective Sequence Calculator. Even when it stores this many numbers, access to them is only two-dimensional; they would be punched in series on sixty-six loops of paper tape, and each tape would be fed through its scanning device at a

speed of about fifty numbers per second until the desired number is located. The machine, however, will scan all tapes at once; but since half the loops are short, the time needed for complete hunting is about twenty seconds.

So, for our unit task, in measuring speed of hunting, let us select "referring to a number of ten decimal digits which may be located anywhere—but at a known place—in a slow memory of forty thousand numbers." With this unit, we can compare various speeds of hunting:

SCALE OF SPEED OF HUNTING (Roughly Approximate)

Unit task: Referring to a number of ten decimal digits which may be located at a known point anywhere in a slow memory of forty thousand numbers

Device	Seconds
1. IBM Electronic Selective Sequence Calculator	20
2. Automatic dial telephone	10
3. Human being and five hundred page book of tables	7
4. Planned automatic file using magnetic tape on reels	2

A human being with a book of figures in tables can win over all existing mechanical brains. The reason is clear. The man has four or five dimensions of access into his book. This was less true in the Middle Ages, when books were often scrolls; it was slower to get information out of a scroll.

Mechanically it is not very difficult to position a tape and read it. It is much more difficult to read mechanically a record in book form. No laboratory or company has yet re-

ported the design of a machine to read anything shaped like a book. Engineers have sketched, however, an automatic file using reels of magnetic tape. Imagine a cabinet with perhaps forty pairs of reels holding magnetic tape, and for each pair of reels an electromagnetic head which can sense magnetized spots on the tape. Access to any particular reel would be automatic, as in the dial telephone system. Within each reel, however, information must be scanned in sequence. The speed of scanning ten-digit numbers on magnetic tape is perhaps five hundred per second, and their density could be one hundred to the foot. So on one ten-foot reel, we could store one thousand numbers, and the maximum time for finding the desired number out of forty thousand, scanning all the tapes at once, would be two seconds. So man's victory is not likely to last long.

Even now, man's victory in this one event is a hollow one. For, both the automatic file using magnetic tape and the IBM Selective-Sequence Electronic Calculator have really a tremendous advantage: the numbers do not have to be located each in its own place in sequence—they can be scattered anywhere so long as each is identified. All the tapes are scanned from end to end, and the machine can find any information in the whole file with no additional time needed, and irrespective of filing or misfiling. This power,

of course, is far greater than a human being's.

THE FUTURE

The speed with which thinking can be done depends in the last analysis on the speed with which some basic component—nerve cell, relay, electronic tube—can change from a state representing 1 to a state representing 0, or vice versa.

In the experimental work with the mechanical brain Binac in 1949, there were some indications that the basic repetition rate of cycles that could change the state of an electronic tube from 1 to 0 or vice versa, at which the machine could still function, was something like five million cycles a second. It seems probable that somewhere between five and one hundred million cycles a second is the foreseeable speed for operating a mechanical brain. Thus in the future a factor of ten or one hundred over present top mechanical brain speeds is indicated.

So, for writers and readers of science fiction, we can estimate a benchmark for the maximum speed of thought in the mechanical brain of the future in science fiction. This speed is something like one hundred million times faster than a human being.

In other words—and with appropriate suppositions—the thinking of a future science fiction mechanical brain over a quarter of a minute is in quantity about equal to the thinking of a human being over a lifetime of seventy years!

THE END

FAIR PREY

BY J. D. LUCEY

The question of "alien" is, it must be recognized, strictly a relative term; it depends on where you're standing — and sometimes you're not in good standing!

Illustrated by Orban

The two men finished laying open the creature's thoracic cavity, stepped back to the tentside and ripped the rubber gloves from their sweaty hands. Technicians, who would sculpt the master model of this thing, moved in and began taking their dozens of pictures of the exposed organs.

Drying his blunt-fingered hands, Dr. Alexander Halstead shivered involuntarily. All the time he'd been working, he'd felt those huge, slanting dead eyes were watching. The thing gave him the willies.

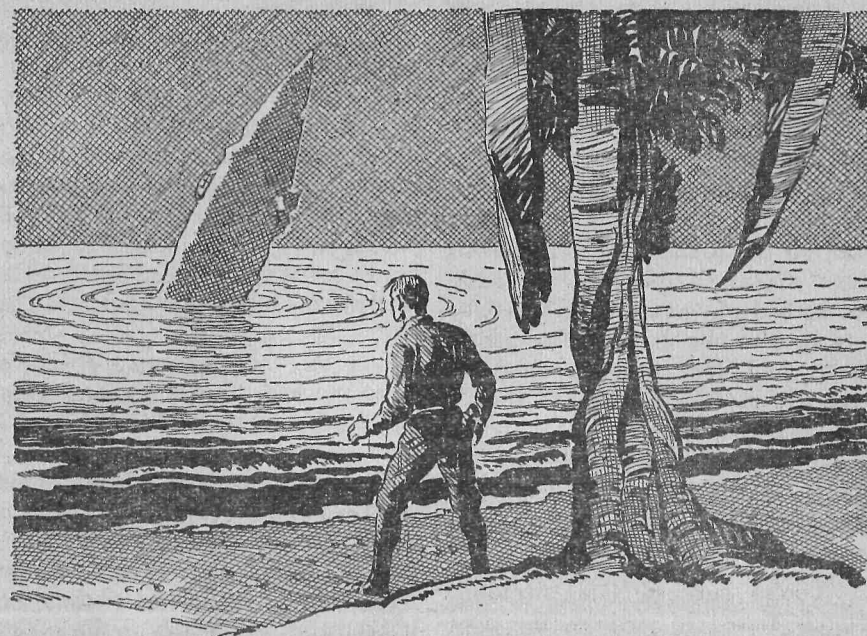
Dr. Kramer called across the tent space to the man in uniform: "Halstead and I are going out for a smoke. Come along?"

The government security officer was slightly green about the gills,

but he shook his head and stayed on his job.

In the darkness outside the tent, Kramer's quiet, deep voice said, "What d'you really think, Alex?"

"Don't know what to think." He was studying the stars, his mind far off the subject, thinking of his nephew, somewhere up there in space. Wondering what madness had impelled men to the Galaxy before they'd colonized the planets. But once more the southern latitude and the multiplicity of stars that hung over the Andes defeated his quest for Alpha Centuri. He flipped his cigarette out over the cliff into the mist-hung gorge, lit another, and said, "Disagree with you on that mutant idea. Perhaps all evolution is of a mutant nature. But this— Muta-



tion from what, Kramer?"

"But if that's true—"

They looked at each other, looked quickly away.

Kramer muttered, "If only we had something to go by!"

"It lived in that forest there. Start with the forest."

"I meant something physiological. Never saw such a bizarre set of organs in my life. And yet—"

"Well, wait till Stanton finishes with the stomach. When we know what it's been eating and what happened to what it ate, we can go on from there."

"And we'll still never know if those foods were its natural—" Abruptly, he became silent. Ten

yards from them, a tall thin figure stood looking into the depths of the gorge: Loring Bishop, newspaper correspondent.

He'd been the expedition's honored guest. But that was when the expedition had been a simple affair—just a group of botanists, zoologists, geologists, archaeologists and anthropologists; twenty-three scientists having themselves a good time exploring every aspect of a single large Peruvian valley. But they'd stumbled into the unknown animal; Bishop had radioed the news out; the United States Defense Command had suddenly co-operated with Peru; now it wasn't simple, it was an army project and Bishop was a pest.

Indicating the stars, Halstead put the conversation on safe ground. "Kramer, what makes us go up there?"

"I'd like to go. You would. I guess that's it."

Halstead studied his cigarette coal, thinking of his nephew and the other men on the *Gallant III*. Trained to exist. Cramped quarters, synthetic foods, bad oxygen, artificial gravity—trained to take that for five years. Then land, look around; then the long trip back. No, Kramer's wasn't the reason.

Loring Bishop shuffled over to them. "How's the autopsy coming?"

"*Animalopsy* is the term," Kramer grunted.

"You're sure of that, doctor?" Hands thrust in pockets, the man rocked slowly on his heels. "What'll I tell the folks at home?" Neither answered him. "All this mystery—first you people getting vague with me, now the army—if you don't give me facts, all I can do is keep on being mysterious, keep on building their excitement. What'll I tell 'em?"

Halstead told him, "Question one of the security men."

"They haven't opened their mouths for days. Now, come on! Let loose on something I can make important. O.K., I'm a pariah! And whadya suppose will happen when you get back? Just get close-mouthed with newspapers, and from then on every time you open your mouth it's apt to get reported in a way that makes you a fool."

"Why, you—!"

"Kramer!" Halstead grabbed his arm. When he felt the muscles relaxing, he let go and swung to Bishop: "Leave us alone, or I'll recommend you be put under guard. As for the rest, I would tell your papers only what the security officers tell you to say. And no more. The army knows what it's doing, Bishop." He turned and followed Kramer to the tent.

Out of the darkness, Bishop's voice mocked, "I wonder how long you'll believe that, Halstead?"

The Electrician's Mate stopped his panicked swimming, turned to watch the *Gallant III* sinking slowly by the bow. He didn't know why the ship had crashed; he'd been testing the instruments inside the air lock. On his back—one hand digging up behind the panel—he'd been trying to feel "blind" what was wrong with a solenoid's connections. Then the air lock's rubber-matted flooring slammed his head.

He didn't know the depths they'd plunged to. But what the terrific compression of the ship's air had done to his comrades told its own story of those depths; and the sudden decompression when the bubble thrust the *Gallant* back to the surface. Now, he watched the ship being sucked easefully down by the sea, watched till the waves subsided, then slowly turned in the thick heavy water and swam for the green, waiting shore.

He stood on the beach a long time

before he bent, awkward and self-conscious, and ran his hands through the pebbly sand. Land! The stuff that had been an ache in him for five years. But he discovered now he no longer had any real interest in land. He'd been too long on the ship. He looked back at the sluggish water—hadn't tasted very salty.

The final awfulness of the crash pressed down on him while he sat in the reddish sand and gazed out at that empty sea. No way to go back. Billions of miles from home, better than five years of free fall. And there was no way back.

Hysterical laughter shook him, suddenly stopped.

He looked round him—at the slaty red of the soil where the pebbled beach broke off. At the peculiar vegetation. Trees high as California pines, yet with a segmental-stalked primitiveness like all the other plants in sight. Dull green, swollen, and greedy.

The air was heavy and cold and clogged his lungs. The focus of his eyes drifted and made him dizzy. A little too much oxygen, he remembered, too low gravity, differences in pressure. Doc Jordan ought to be happily taking notes right now. He pulled his thoughts from the men and looked at the two hazy suns. One up there on the left, another crazy small one, not as big as the moon, a little shaver way out low on the horizon.

A soft breeze gagged him with the fetid breath of jungle.

The silence screamed at him, the

world pressed down, and his hands grabbed the sand, clung to it. The sand squeezed slowly out, and he held dust.

He stood up.

It was night. There was no moon, but thin phosphorescence came from parasitic creepers tangled in the trees. By that light, he followed the animal track. His muscles ached, the bones themselves ached; calisthenics and exercising machines hadn't readied him for jungles. His hands were swollen and raw from tearing at the creepers.

Ahead, leaves rustled.

He froze stiffly and clutched the butt of his Colt's blasting pistol. He moved forward, flushed something, sent it scampering noisily aside. Abruptly, the noise ceased. The jungle had thinned out, but he had to find a clearing before he dared stop. Nor could he retreat. Much better to be the stalker than the stalked.

From behind a fern, three great bulbous watery eyes lifted.

He sucked in his breath, stood rigid.

A lizard! Enormous; ten feet of a double ridge of horn ran from the head to the tail's tip. It looked like a gecko.

Before he could move, it shot off into the undergrowth.

"Scared enough," he thought bitterly, "without the thing disappearing on me. That mouth— And *three eyes!*"

He eased behind the fern, crept slowly between creepers that still

swayed from the lizard's passage. He came out in a small clearing. Beside the trunk of a fallen tree, the lizard squatted—immobile; an artery pulsing huge in its throat; the three eyes glistening.

The gun's heat blast slewed it around, smashed the head against the tree.

He stepped up to the thing, kicked at it, and the still quivering tail lashed round against his legs. He lay long minutes on the ground, teeth clenched, fighting the pain that rocked up from his thigh.

He'd had to kill it, but now he remembered he'd had another reason, too. He'd eaten hours before the crash, and that was at least fifteen hours ago. He stared at the lizard until he could ignore his nausea. Afraid the nausea would return, he decided not to wait for the tail to die.

The second blast from the Colt smashed off two feet of tail. The bleeding segment squirmed and lashed about, and he had to lay a rock on it to keep it handy while he built the fire.

All day he'd been trying to figure just what he should do to make the best of his situation. From the looks of the place, there couldn't be anything intelligent. The lizard confirmed that. This was a Reptile Age, and on Earth and Mars, that had come before intelligence. Yet even if there were a civilization— They couldn't get him back. And if he couldn't go back—

But when the time came, it'd be by his own gun. A planet as primi-

tive as this— None of the deaths it could hand you would be easy.

He waited for the tail to stop quivering— iguana steaks are supposed to be good eating. But how close was this thing to iguana? In the forest, thrashing vegetation and a high keening noise as some animal died. He put more wood on the fire, burned his hand trying to get a real blaze going. And just how do you cook iguana, anyhow?

The steak tasted terrible.

He sat hunched close to the fire, fed it more wood now and then, and fought off sleep. His stomach felt bloated. Somewhere, teeth chattered— a constant, insistent sound like a slow-worked ratchet wrench. Insects, he told himself, insect wings.

A contented feeling flooded his body and he laid back on the ground. Never eat lizard meat, he told himself. Makes you sleepy. Never eat—

He woke to a noise like ducks quacking. He jerked to his feet and slid quickly into the ferns. Footpads sounded now, and as the quacking came nearer, it lost some of the duck quality. It took on form, became wordlike. Realizing that, he hastily checked the mechanism of his gun.

His heart was pounding at his throat in an excitement half of joy, half of fear. Then four short and stub-legged *things* entered the clearing. Heads wide as the bodies. Shoulders that sloped so deeply they joined the arms with no angle. Tiny hands that swung hardly lower than the thick waists. Legs huge in pro-

portion to the arms—yet too short for the body. The faces— fish-featured.

At first, he felt something about them was oddly human. Then knew suddenly—whatever these were—they were not men. *Things*.

But they talked; they had hands; they walked erect; they wore clothes—grayish togas, a girdle supporting a long blue tube. Too near human; and the feeling of revulsion stayed in him.

They were following his tracks when they arrived in the clearing. They stopped short, then ran with swaying, rapid steps to the dead lizard. They gesticulated and screeched at each other in their quacking words. They discovered the remains of the fire and what had been cooked there, and they became abruptly silent.

The way they fingered the tube weapons, the way they talked in low voices told him he'd committed some crime.

Then they got to arguing. The shortest one kept pointing at the foliage and saying over and over, "Ukk! Ukk!" The other three waved stubby hands, all of them talking at the same time, yet somehow making it clear even to the man who watched that they wanted more help before tracking whatever it was that killed the lizard. The short one at last gave in, and all four turned to go back.

His gun jerked upward. His sights followed their course across the clearing. Kill them, he thought. Bury them and the lizard; then find

their village and start things off on a friendly basis. Savages. Dress like savages. Worship those three-eyed monsters like savages. Why, they'd treat a man like a god! God of the Ukks!

But he couldn't pull the trigger. The revulsion at Nature's far miss was still urging him on. Yet there was something else. He watched them leave. He looked at the way his finger had gone white from straining against its extensors to pressure the trigger. He cursed himself with meaningless obscenities and wondered if he was already going crazy, and still he didn't know why he'd held that finger stiff.

He heard them stop, argue again, then three of them re-entered the clearing. They stood in the center, silent, eying the fire, listening to the fourth's footsteps dying out in the distance.

He wondered if his crime could be forgiven. After all, he was an alien to them. As soon as they knew that, maybe they'd forget he'd eaten somebody's pet dog. Reholstering his gun, he stepped out of the foliage.

Three pairs of enormous eyes widened, blinked, blinked, blinked. The sight was so funny that his smile became natural, and he stepped forward, all fear of them gone.

They backed away. Their hands swiveled the blue tubes in their belts to center on his stomach. His guts went hollow, abdominal muscles involuntarily tightening, and the words came out of him choked and chopped

up. "I won't—hurt you. I'm . . . just visiting." He stopped. He should keep talking, he knew that; it didn't matter that they couldn't understand.

He smiled broadly, raised both hands to show himself weaponless. They recoiled as from a blow. He pointed at the sky, drew a long line from it to the ground under his feet, pointed at himself, smiled. They blinked, once, in unison. He dropped onto his knees, his face on a level with them. "Look here!" His hands brushed leaves out of the way and he quickly diagramed the solar system. He moved several yards to the right, traced the Centuri system into the loam. He pointed at the sky, at the Sun, at the Earth. "Me. Me, Earth!"

"Urkh!"

"Attaboy, Shorty, now you're catchin' on."

He drew a long line from Earth through the leaves to Pellem's Planet. He indicated everything around him, tapped the diagram. "This, This, what?"

They looked at him, their great eyes bewildered and frightened. He did everything again. "Me, come from—Earth. To here."

"Urkh!" They eyed each other in an agreeing, decisive way that made his hand drift toward his weapon. "Urkh," they said, all of them.

"Listen to me!" They spread out from him, drawing the tubes from their belts. His open palm flailed out, smacked the nearest Ukk into the short leader, and both rolled to the ground.

A *snick* came from his left, a hard blow struck his side, crashed him sideways into a shattered tree trunk. He fired the Colt as he slid down the trunk, a luck-shot that decapitated the Ukk.

He rolled quickly, swinging the Colt around, and sight of his gun-muzzle held the other two rigid where they lay. He rose slowly to his feet, one hand exploring along his side for the wound. There wasn't any, and a sudden weakness flooded over him as he realized that he'd been flicked lightly by a muzzle blast; the Ukk had missed, and the steaming, cracked tree was the result. Whatever they were, they weren't savages. Yet they'd understood none of it.

Ought to kill these. He grinned, raised his hand and waved so-long, then let the ferns fall around him.

The hill was mostly brush and little scrubby thorn trees. At its top grew seven tall, strange conifers. He sat in the highest of the seven. All round the foot of the hill, hundreds of the toga-clad Ukks were strung out in a double line. The first line beat the brush to flush him out; the second backed them up, and when in thick brush, beat it again.

At first he hadn't known about that second line. He'd been hiding then in the sour-smelling fern trees that grew on the other side of the hill. Two beaters flailed at the springy ferns over his head. He rushed, knocked them aside and ran down the hill. He ducked out of the

ferns, leaped over brush, crashed through brush, twisted round a thorn tree, and his arm was hooked and he was thrown rolling. His teeth ripped the thorn from his flesh. He got up and ran.

The screeching of the Ukks fell far behind. He heard only his thudding boots, the brush whipping past his legs, air sighing past his ears, the panting sobs he made when he breathed. He pounded down the bank of the shallow stream separating the hill from the forest. An Ukk stepped from the trees; others.

Silent, they watched him come down to them. His feet braked wildly, tossed him on his face. They ran from the trees—swaying; their slope-shoulders thrown far back to maintain their balance. He spotted a weak point in the thinner line closing from above, and his aching legs carried him back up the hill.

Crashing them from his path, his fists swung with the uncontrolled rage of hopelessness. He struck cruel unnecessary blows, revenge blows; and the low gravity and high oxygen made them worse—he wanted to inflict pain and more often killed instead. He picked up one of the little Ukks, slung the thing ahead and burst a final hole in their line. Soft bones crunched under one boot as he stumbled out.

He was treed. They didn't know about that. They were still beating the dense brush below. But any minute, the extremely slow moving jet plane that kept diving in silent

swoops at the hill would spot him. Then the two lines would close up round the tree.

You could kill maybe twenty of them, he was thinking. But as far as killing's concerned, they could've fixed you a long time ago. One of those blue tubes could rip you apart. It came to him now why it was he hadn't been able to kill the two Ukks he'd left in the clearing this morning. Like the hard job a man has trying to make himself shoot a monkey—pity, or something. Ukks and monkeys hadn't made the grade.

If he'd let himself see that the tubes put Ukks as far from monkeys as himself— If he'd realized they were civilized, that he *had* to kill them— If—

He wiped at the sweat streaming from his overheated face, then raised the gun, looking for the leaders he'd shoot first. Every Ukk down there had a weapon. There were clubs, quirts, long-handled knives, blue tubes. But not even the differences in weapons seemed to indicate command grades. He couldn't figure it. Nor why no Ukk had tried to use a weapon on him. Their pudgy hands had grabbed for his legs; they'd tried to climb his back, to drag down his arms, to trip him. He'd been killing them, and still they'd done that.

The jet swooped low, made a slow turn about the group of conifers, climbed away.

He wished now he hadn't killed the lizard.

He remembered the glimpse he'd caught of a Thing family when he

ran across the road that cut the forest back there. They were feeding one of the giant lizards; and they were happy. The mother was coaxing a little one to let the geko eat from its hand. And to the side of the smiling parents an older brother was aiming a short tube with a lens in its end.

There was a tear-shaped, tri-wheeled vehicle parked behind them, but one glance at the apparent complete lack of controls told him he'd have no chance with it.

He came out from the foliage, shot across the road and ducked into the trees. Behind, he heard the lizard scuttle away and heard the child wailing its tearful disappointment.

Vacationers. Happy people—the word gagged his mind and he changed it—happy Things that saw something cute in that splay-toed saurian beast. Like tourists feeding bears in one of the National Parks.

Now, sitting there in the tree and thinking of them, he knew this was a lot higher civilization than he'd wanted—cars, cameras, jet planes. And he saw suddenly *how* he'd fit that culture.

The noise of the beaters had ceased. Looking down, he met hundreds of flat, ovoid eyes staring up at him—a dense sea of identical hairless faces—as though some tireless sculptor had started and started the job, and always run out of inspiration at the same place, half done.

A dozen Ukks dragging a heavy net panted up the hill. Weapon tubes in hand, thirty or more stood sta-

tioned round the tree. Resilient on its landing jets, the plane lowered slowly to the brush. Three telescoping tubes eased down from the fuselage and dug hooked points into the ground. The jets shut off and the plane rested on its tripod. The cabin door swung open and the pilot lowered a metal ladder.

With much direction from the pilot, Things helped a tall fat old Ukk climb down. Folds of wrinkles hung from the old Ukk's face and swung like wattles as it hobbled forward. It placed stubby hands on a sagging stomach, leaned slowly back and gazed up at him through oddly designed spectacles that gave the eyes a basilisk and reptilian look.

Two young Ukks stood close by, grim and with the air of men impressed with their own importance.

The old one grinned suddenly and slapped his stomach. Turning to them, he quacked harsh, excited words. They stepped back a pace and bowed from foreshortened hips. Perfunctorily, he returned the bow.

The two Ukks slowly climbed the tree, their short arms emphasizing with each upward reach the great exertion required. Below, the old one screeched commands at the mob. Ukks went to strengthen the force of guards; others went to help with the net; except for one small group, all the rest were set to clearing brush in a wide path that led outward from the tree. The final group stood by, leaning on their long axes, ready to cut the tree if the two ambassadors



failed.

It was all planned very nicely, the man decided. He was to be captured, preferably in good condition. Preferably.

The two climbers stopped on a thick limb twelve feet below. Their uneasy eyes swung jerkily from him to the ground, to each other. He realized that both himself and the distance to the ground had them scared stiff; and for the first time since the *Gallant's* crash, the man laughed. Laughed loud and defiant. Roared it down at them and their lizards and the whole crazy world he was lost in.

Their eyes gazed unwinking at him. The laughter stopped and he smiled at them a long while. Finally, he raised one hand, palm outward in the immemorial sign of friendship. The fish mouths opened a little.

If he could show he was intelligent— Yet he knew all of them long ago must have realized that.

He opened his mouth and panted, then pantomimed he was holding a cup to his lips and drinking from it. One of the ambassadors made a movement he could have sworn was a shrug—Italianate, palms upward and everything.

He shrugged.

They laughed—a high, piping noise that was laughter because they smiled. One murmured to the other, and they both yawned and stretched their arms.

He nodded and yawned, then suddenly pointed at the old Ukk down below. When they understood the Ukk he meant, he made the motions of taking glasses off his nose, breathing on them, and polishing the lenses. At first they seemed to follow, then they lost it. And he wondered if, besides extremely slow jets, they also had glasses that never needed cleaning.

One of them pulled a package from his blouse. Unrolling it, he held up a strip of half-cooked meat—lizard. He made noises: “Uh!-da-da. Uh!-da-da.” Smiling and friendly and too urgent, they motioned him to come down and get it.

His fingers drew frantic circles in the air. Triangles. Spheres. Ellipsoids. He pointed at his clothes, unbuckled and buckled his belt, he drew a pentagon.

The Thing nodded and smiled and held up the meat.

In a way, they looked like humans, yet like fish and pigs, too. They saw something cute and friendly in ten-foot gekos. The mentalities were too different. One man, alone and treed, could create no common ground. Even at best, he'd be a live Exhibit A in some scientific waxworks like Uncle Alex's lab at the U. No freedom—And this planet's low G and abundant oxygen—He'd live a long time with the

constant knowledge some over-inquisitive Ukk physiologist would finally get impatient and let an accident happen to the laboratory item. He'd stave that off a while, sure. Scheherazade and a thousand and one nights' entertainment.

All this he saw; and saw, too, that “Uh!-da-da” was what Ukks called to things up a tree. Just like here!—kitty-kitty-kitty!

Before, no way back. Now, none forward. And the long-swirling anger that was in him roiled up at last, took over.

Yet he still held no real animosity for them; no more than they had for him. It was just that he understood too well.

One calm, controlled motion slid the gun from its holster. He was fighting back; and because of that, down under the anger, he was in some dim and curious way immensely happy.

The one with the meat was still calling, “Uh!-da-da. Uh!-da-da.” The Ukks on the ground were stirring around; excited, impatient with waiting. The man laughed, and the ambassadors clutched each other. Ukks below began calling advice to them. The old one shouted angrily to the mob. They couldn't hear him; the shouting was a crescendo of voices—humorous and playful—and the blood-call whipping at the edges.

Both ambassadors began yelling at him: “Uh!-da-da. Uh!-da-”

The heat's blast crashed them down, splattered them at the old

one's feet. The second blast crushed his pulpous body onto their legs.

The guards' tubes were still rising when the smiling man swung the gun around in his hand and pressed it against his chest.

In his office behind the lecture hall, Dr. Alexander Halstead finished dusting the plastic replica's skull, and the Andean Exhibit's huge slanting, crystalloid eyes peered knowingly back. It had been standing there for two years now, yet as always when he looked at it, a shiver rippled his spine, and he laughed at himself, wryly cursing man's fear of whatever things are unknown.

As a great zoological unknown, it made a good subject for tomorrow's lecture—spice for a dreary section in a dull course in human embryology.

But tonight he'd have nightmares.

Absently polishing his glasses with a square of lens paper, he drifted into a daydream of the honorary degrees, the fame that might be his when his theory of the Exhibit's origin was published. He jerked himself back to his surroundings. He was a research man; all his adult years he'd been presenting theories and they'd often proved correct. He'd got no honors, no fame; he was still just another professor, who daydreamed. He riffled through his lecture notes: “Partial development only of all systems except nervous and endocrine; these bizarre.” “Do not mention difficulty finding suitable foods. Avoid—”

Someone knocked lightly on the office door; he called, and one of his students stepped in—a small man, dressed in old rumpled sport clothes, badly in need of a haircut—an older student starting pre-med rather late in the game. He rested his books on Halstead's desk and inquired, “Is it possible to make up last week's test, sir?”

Halstead shook his head.

“My car broke down, generator trouble, and—”

“Sorry, the University doesn't allow make-ups.”

“Well—” He turned uncertainly, then stopped, his gaze caught by the Exhibit replica. He said, “Say, I hear you've written a paper on that thing. It been published yet?”

“Haven't finished writing it yet. I'll let you know, though, if you like.”

“Well. From what I hear, you really rip Kramer's theory to shreds.”

“Well, his postulate of a Mendelian origin simply isn't logical. Mutation doesn't produce Exhibits. I—”

The student laid an open card-case on Halstead's notes and said softly, “It is the wish of the Defense Command that you keep your theory to yourself.”

“You're Security!”

“Yes, sir.”

Halstead's hand clenched hard around the arm of his chair. At last he asked, “Why should I keep quiet?”

“By the Acts of 1973 your degree

automatically makes you a member of the Scientific Corps Reserve. Fail to co-operate in this and you will be called to active duty. You will be assigned to a thoroughly isolated laboratory area where—"

"I know all that!" After a moment, his strained voice added, "It's been two years since we discovered the Exhibit. At that time we thought we might find more of them, so we followed the army's wishes and kept our thoughts to ourselves. But no more have been found. This is my work, man! I can't keep quiet any longer! There's no reason!"

"Weren't you with that expedition?"

"Yes."

"Well, then."

"Well, *what!*"

"You didn't hear what the army discovered in that forest? They found parts of a large machine of some sort, doctor. Like no machine ever built on Earth."

At the doorway, he turned. "I'll leave it to you to figure out the implications, doctor." He strolled out, slouch-shouldered and tired-eyed—a student.

The night passed in nightmare. The morning came, and Halstead walked to his lecture hall on old, tired legs that had no more spring in them. The bell rang. He cleared his throat sharply and brought the class to order. He spoke with asperity, all his usual humor gone. He rested one hand on the head of the plastic reconstruction: "*Homo suspectus*—

suspected of belonging to our own genus. In my opinion, farther from us—part of our family or order. Primate, in any event." His voice lifted in sudden anger: "It must be obvious to any thinking person that newly discovered animals are more valuable to science alive and kicking. Yet one chain of tabloids insists we deliberately killed the Exhibit.

"The creature was surrounded; it had no escape. It killed itself. Just as, captured, some animals kill themselves by refusing to eat. Even domestic cattle 'sull' and die. This case is similar. Regrettable, but at least we managed to get an excellent specimen for animalopsy."

His eyes fell on a student slumped in a back-row seat, an older student, starting pre-med late in the game. Suddenly nervous, Halstead fumbled and nearly dropped the upper half of the plastic skull as he lifted it away. "The brain is enormous. As you know, the number and complexity of a brain's convolutions roughly indicate the intelligence. There are mighty few wrinkles in that over-large cortex. Rats are built the same way. So newspaper talk about the Exhibit's intelligence is again just talk. The animal had cunning."

Quickly, he switched to technicalities of the spinal chord, for there was always the danger some excessively bright youngster might ask the wrong question about that brain.

He talked now from his notes, hardly conscious of what he was saying. *Last night, thinking, and re-*

coiling from thought of the nightmare problem of the Exhibit. Whole phrases leaped out at him from his subconscious. Deny man knowledge and he kills or outwits you. For the Unknown is Fear.

Challenge his weapon for gaining knowledge, his intelligence, and he exterminates—immediately, without thought.

The being had challenged man's weapon. You cram facts into students' skulls. You give them so many and so fast that they have no time to think them over. They'll never realize that in brains it's the wrinkles that count, not their proportion to the brain's volume. *Homo suspectus*—wrinkled as numerously, as complexly as Man.

Halstead stared a moment at the uninterested student in the back

row. A make-up, the man had wanted. And how do you make up the wasted research of two years?

Nightmares, of a place that man must discover and conquer, or destroy. A place that till then must have no inkling of the Earth, or of Man.

Words, they were. Words that were making him just one more lecturer with no interest in his subject. For he was too old, it couldn't happen to him again; he would give up all research, all *effort*. Words that would haunt the corridors of his mind and make him testy and bilious and retire him to mediocrity. Words—

In Exhibits the unknown must also equal fear. If they learn of us, who exterminates whom?

THE END.

BACK ISSUES

A limited—very!—number of back issues of Astounding Science Fiction, back to 1936, are available at the editorial offices. From past experience, they won't last long; there are, for instance, three copies of the August 1936 issue, one for September 1937, and none for any 1940 issue except January.

First come not only first served, but frequently only served!

THE EDITOR.

BOOK REVIEWS

"Pattern For Conquest," by George O. Smith. Gnome Press, New York. 1949. 252 pp. \$2.50.

Another publisher reports that unabashed space opera is the surest seller in the science-fiction book field today. Though I, personally, prefer George O. Smith in his "Venus Equilateral" vein, with "Pattern for Conquest" he shows that he can slip right in with "Skylark" Smith and "World Wreckers" Hamilton and slap the stars around. If you've forgotten, this is the story of the fused opposites, Stellow Downing and Clifford Lane, plus the Little Men, plus the cat race, plus the Galaxy-conquering Loard-vogh—plus, above all, one of Smith's tricky twists of inverted values. Read it again and argue it out again—is Mankind's "secret weapon" valid? A physical or a psychological defense mechanism? P. Schuyler Miller

"Masters Of Time," by A. E. van Vogt. Fantasy Press, Reading, Pa. 1950. 227 pp. \$3.00.

A. E. van Vogt's polydextrous, multiply-jointed plots recall the labyrinthine webs which Harry Stephen Keeler used to weave through volume after volume of his old-style mystery-thrillers. It is a tossup whether the reader really tries to puzzle out what the heck goes on be-

hind the scenes and who is on which of several possible sides in the she-mozzle, or whether he limply abandons himself to wondering what can happen next.

Here under one cover, with Cartier illustrations and jacket, are two of the shorter yarns with which van Vogt got in training for *Null A*—the title story and as a bonus "The Changeling." Probably the final sentence of "Masters of Time" best sums up the mood of the whole: "Poor, unsuspecting superman!"

P. Schuyler Miller

"The Incomplete Enchanter," by Fletcher Pratt and L. Sprague de Camp. Prime Press, Philadelphia. 1950. 326 pp. \$2.50.

This new edition brings back into print the first and best of the Harold Shea stories which, probably more than any other, represent *Unknown Worlds* at its peak. They have an even deeper significance, moreover, in that through the fiendishly clever application of symbolic logic Pratt and de Camp have in one fell snatch annexed the entire realm of "pure" fantasy to science fiction, and most blackly confounded those eminent scholars of the genre who insist that science fiction is but a back-eddy in the stream of weirdness. Shea and Chalmers proved that anything can happen—if you know the rules of the

game. The collector will have both editions—plus the originals in *Unknown*. P. Schuyler Miller

"The Martian Chronicles," by Ray Bradbury. Garden City: Doubleday & Co., Inc. 1950. 222 pp. \$2.50.

Mr. Bradbury's Martian stories have made a stir in the field, and now comes a whole book of them, forming a connected account of the settlement of Mars by Earthmen, 1999-2026. The early settlers find a few surviving Martians—fragile humanoid creatures with a shape-changing power they sometimes use against Earthmen. The latter, mostly Americans, settle, but when atomic war engulfs Earth they nearly all rush back to Earth for its final destruction.

Bradbury is an able young writer who will be better yet when he escapes from the influence of Hemingway and Saroyan—or their imitators. From Hemingway he takes the habit of stringing together many short simple sentences and the Providential or impersonal viewpoint, all characters described purely in terms of external action. All right for Hemingway's Neanderthaloid characters with no minds to explore, but of limited use in a fiction of ideas.

From Saroyan—or perhaps Steinbeck?—he takes a syrupy sentimentality. He writes "mood" stories, of the sort called "human," populated by "little people" named Mom and Dad and Elma and Grandpa. They come from American small towns

and build others just like them on Mars. They're the kind we all know and call "nice—but dull."

His Earthmen and his elusive Martians are alike given to strange irrational and destructive impulses. Sometimes the Martians satirize Earthly faults and foibles; at other times they are the pathetic victims of Earthly brutality. At the end they have all been killed or have died off to deepen the melancholy of the scene.

Bradbury belongs in the tradition of anti-science-fiction writers like Aldous Huxley who sees no good in the machine-age and can't wait for it to destroy itself. With all these reservations, however, his stories have considerable emotional impact, and many will love them.

L. Sprague de Camp

"Sidewise In Time," by Murray Leinster (Will F. Jenkins). Chicago: Shasta Publishers. 1950. 211 pp. \$3.00.

Six stories by an old-timer and reliable entertainer: five ranging from good to excellent and one stinker. Most have appeared in this magazine. They are:

"Sidewise In Time": A short novel, one of science-fiction's classics, and perhaps the first story to exploit the alternate time-track concept. Something goes wrong with the universe to scramble the alternate worlds, so that the United States finds itself full of enclaves wherein the Confederacy won the Civil War, or America has never been discov-

ered, et cetera. Unforgettable.

"Proxima Centauri": Another short novel, but out of the bottom of the trunk. Cardboard characters including a sneering hateful villain who is (why?) exec of a huge unarmed (why?) spaceship making the first flight to Proxima Centauri—actually a stinking little red dwarf with about twice Jupiter's diameter—where they are captured by fiendish (why?) Things. The story's only virtue is fast action.

"A Logic Named Joe": Amusing short about an all-purpose communicating and information-giving machine that wreaks havoc by starting to solve everybody's personal problems.

"De Profundis": Good short about a sea serpent who finds it hard to believe in people.

"The Fourth-Dimensional Demonstrator": Short classic. Man inherits a duplicator which works fine until he starts duplicating currency, a pet kangaroo, and his fiancée. I seem to remember the magazine version as different in spots—and better.

"The Power": Excellent sad little story about the efforts of an extra-terrestrial to impart advanced scientific knowledge to a medieval European steeped in magic.

Barring "Proxima," a fine entertaining collection.

L. Sprague de Camp

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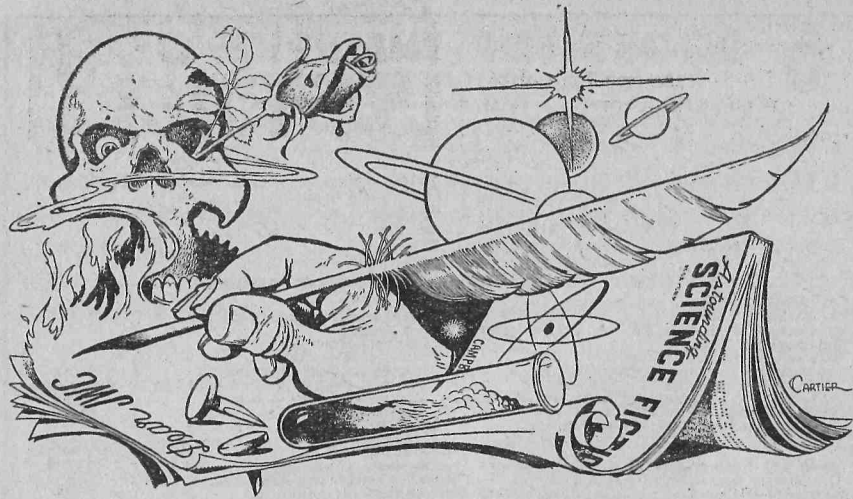
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Dear Dr. Campbell:

If any of your readers are "woefully" ignorant of even the existence of a major science—that science is almost certain to be linguistics. And your readers probably represent the most widely read group in America.

The late Professor Bloomfield once wrote that the achievements of linguistics since its inception represent the most striking achievement of what can be accomplished by the most rigorous application of the scientific method. He also laments that of all the sciences linguistics has had the smallest spread even among workers in closely related fields.

One has only to talk to the average professor of literature to recognize the astounding truth. Even the semanticists, who should know better, are often inadequate here. And

the philosophers seldom seem to understand the findings of Russell, et cetera, about the derivation of logic from basic language pattern.

I have come to expect the impossible from your magazine, but, I really never realized that you would ever print such a fine paper as "Linguistics and Time," by Arthur J. Cox. Too, your introductory blurb hits a big nail squarely.

Astounding besides entertaining people certainly is an educational force with no counterpart. Whether you intend this or not, you do edit a unique school of education. Today, 1950, it seems clear that all of our "intellectual" activities, letters and science alike, need to re-examine that phenomenon they have used so trustingly—language. It is a sad commentary on our educational devices

that you could say, "I will guarantee that you will find remarkable difficulty in getting these concepts clearly and permanently in mind."—Walter Houston, 811 N. 5th, St. Charles, Missouri.

A purr is understandable in any system of linguistics.

Dear John:

Regarding Mr. Macklem's comments on my article "The Mayan—Malayan—Elephants," he says the Diffusionist hypothesis is "too well established to be refuted by these methods." But a theory, even if correct, is not "established" until it is accepted by the "orthodox scholars" for whom Mr. Macklem would seem to have something less than the "awe and reverence" he attributes to me. Diffusionism isn't.

If he wants a more precise terminology to describe the Diffusionists and their opponents, we may speak of the former as the "Rivers-Smith-Perry school who believe in cultural diffusion to the exclusion of independent invention," and the "non-Rivers-Smith-Perry school—that is, all the other anthropologists—who believe both in diffusion *and* in independent invention." If one wants shorter terms one can speak of "Diffusionists vs. Anti-Diffusionists" or "extreme Diffusionists vs. moderate Diffusionists" or even "exclusive Diffusionists vs. Diffusion-plus-Independent-Inventionists." Suit yourself.

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Perhaps coincidence is "never an acceptable explanation of anything" to Mr. Macklem, but others find they must accept it sometimes, however tasteless a solution, in the absence of any more plausible hypothesis.

As for pyramids: Many explanations have been proposed for the extra tombs of Zoser, Amenemhat III, and other Old-Kingdom Pharaohs: (1) That they built two tombs apiece, one for the body and the other for the *ka*. (2) That the truncated pyramid of Dashshur was built, not by Snefru, but by his predecessor Neferkara-Huni. (3) That Snefru, when he had finished his step-pyramid at Medum, decided a smooth-sided pyramid would be prettier and began that at Dashhur. I don't know which is right and doubt if anybody else does either.

The granite plug in Khufu's *Khuit*, or the Great Pyramid, was mounted at such an angle that when the wooden props holding it during construction were burned or knocked away it slid down into and sealed the passage to the Burial Chamber by gravity. There it remained until the Ninth Century, when Caliph Abdallah al-Ma'mun got past it by boring through the limestone around it. According to the Arab chronicles he found the sarcophagus intact, smashed the stone lid with sledge hammers, and tore the mummy to bits for its gold. No kings have been found in their pyramids in modern times because acquisitive lads like

Abdallah got to them first, despite false passages and booby traps designed to keep them out.—L. Sprague de Camp, Wallingford, Pennsylvania.

Abdallah had persistence, but not much else to recommend him, perhaps.

Dear Sir:

Your piece called "Choice" reminded me of a quotation of Bernard Baruch's of which you may not have heard and which I am sure you will like. It goes like this:

"Every man has a right to his opinion, but no man has a right to be wrong in his facts."

A letter to Mr. Baruch will confirm its authenticity, and I think it deserves wider publicity than it has received.—Leslie Gorrell, 420 Market Street, San Francisco 11, California.

But the trouble is, so many people have the idea that a definition is a fact!

Dear Mr. Campbell:

Mr. Rudolph Powell Jr. is quite right in his solution to "the problem of the dishonest bellboy" (See November *Brass Tacks*), but his counter-problem, "the case of the secretaryless club," is no problem at all.

Mary, according to Mr. Powell, was the secretary of a men's club,

so she decided to form a club "whose members would be those people and only those people who are secretaries of organizations of which they are not members." The question is, who was elected secretary? Mr. Powell's implication, of course, is that if Mary—or any other member—becomes a secretary, she loses her qualifications for membership. But this is not true. There is no reason why Mary should not be both secretary and member in good standing, for she would still be secretary of the men's club, and therefore, one of "those people who are secretaries of organizations of which they are not members." People who are secretaries of clubs of which they *are* members are not ex-

cluded by the entrance requirement—in spite of Mr. Powell's use of the term "only"—so long as each of them is secretary of some club of which she *is not* a member.

The editor commented on Mr. Powell's letter by quoting Bertrand Russell's paradox. Now, there is a *real* problem. A related problem is the ancient liar-paradox: Epimenides, the Cretan, declares that all Cretans are liars—i.e., incapable of telling the truth. Another form of this paradox was proposed by Jourdain in 1913 and concerns a card with the two following statements—and no others—written upon it—one on either side: (1) "On the other side of this card is written a true state-

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ment." (2) "On the other side of this card is written a false statement." Now, the question is, is the first statement true or false? If it is true, statement (2) is true, but if statement (2) is true, statement (1) must be false. We cannot say it is false, however, because if it were false, statement (2) would be false, and then, statement (1) would have to be true.

The medievals called problems of this sort *insolubilia*, but modern logicians have not taken the hint. For example, the eminent mathematician, Kurt Gödel, of the Institute for Advanced Study at Princeton, used a variation of the liar-paradox in order to prove that pure mathematics must contain an "undecidable" proposition—i.e., a proposition which cannot be proved true, without being false. It follows from Gödel's work that the consistency of pure mathematics cannot be demonstrated within pure mathematics itself.—Philip Kinman, 5649 Cottage Grove, Chicago 37, Illinois.

The interesting feature of all this is that the "insolubilia" are so only by definition—none is a real problem of a real universe. Real problems have real answers.

Dear Mr. Campbell:

I should like to compliment you for the excellent magazine you publish; A.S.F. stands at the head of the

field. Since it is my favorite magazine I hope that you will find room to publish this request in hope that it will bring more like it.

What in the name of the Galaxy has happened to Ole Doc Methuselah? That used to be one of my favorites but many a month has passed since the last one. I do hope that you will publish another in the very near future.

As for the September issue, I liked "The Lion And The Lamb" best, next "Brass Tacks" was by far the most interesting you have had for a long time. Ordinarily I am not a math shark as you put it but Mr. Perstein did a lot of hard work and deserves some credit. There is one thing that perhaps you can clear up for me, on page 153, Col. 1. He writes: "If the ship is of length L' it will seem to observers on Earth to be of length . . ." this is all very fine but in the preceding paragraph he states that his hypothetical ship is shooting away from Earth at the speed of light, therefore the people on Earth could never see the ship because the light would never get back to Earth.

So much for technicality, just keep up the good work.—Joseph Barron, 2745 Stuart Street, Berkeley, California.

I'm afraid there will be no more Doc Methuselah; "René Lafayette" is L. Ron Hubbard—who is now too busy with a larger work to write science-fiction.

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Dear Mr. Campbell:

The November *Brass Tacks* brings out a couple of points which seem to call for comment. Here goes, then.

First, as to Mr. Vincent's letter assaulting the thesis of William Vogt, Fairfield Osborne, and Piper's paratimers. I'd like to come to the defense of this "antihumanistic" view, largely because I feel it is quite the opposite—indeed, that an encouragement of population growth and optimism over the problem of dwindling natural resources is a grave disservice to humanity.

Let me hasten to add that I do not for a moment advocate reducing world population by war. But I do think that that will most likely happen, whether anyone wishes it or not, unless we start applying more humane methods pretty soon.

Mr. Vincent claims that a greater population than this planet now supports in a semistarved condition could be amply fed by simply apply-

ing known scientific techniques. Maybe so. But who, in this insane civilization, is going to apply those methods on the scale which is required? It's a job for an all-powerful international body able to plan generations ahead, and you know darn well there isn't any such governing group and won't be for a longer time than we can afford. Furthermore—and this I think is still more important and has not been emphasized enough—no sooner has science made more food available than uncontrolled human breeding shoves numbers up to the point where nobody is any better off than he was. There are a lot more Americans today than there were in 1850, but are they eating any better? Hell, no, they're eating worse—read the accounts of travelers from about that period, or simply ask yourself how much fresh meat and vegetables—really fresh—you get in a week. This in spite of science and technology.

I'd also like to say a feeble word in defense of the non-use of natural resources. Sure, we could build a dam near the Grand Canyon and log off the woods in our national parks and turn them into farms—but personally, I don't feel it's worth while, just to support a few more people of dubious value. Why not keep some "undeveloped" land for ourselves, rather than add ten million or so more humans none of whom have ever seen sunset over a mountain lake fifty miles from the nearest road? What is this Anglo-Saxon mania to the effect that land which is not logged, dammed, farmed, covered with mines, and sooted by factories is not serving any purpose?

Population increase only presses harder on our dwindling natural resources. (And they are dwindling, Mr. Vincent. As a New Yorker, you ought to be aware of the ground water problems, at least.) Furthermore, old Malthus was right—numbers do go up faster than available resources, even if not in quite so simple a manner as he envisaged. Large sections of the world are populated to capacity now, which is to say bare survival and the threat of famine. But those are the so-called "coiled populations"—given any chance at all to increase, they'll do so at a fantastic rate. Look at what happened in India. Result: famine, plague, and war.

Actually, I shouldn't have said any area is populated "to capacity." Hardly a region in the world but is already overpopulated, and that includes our own country. We can

keep going for a while, after a fashion, by stripping our natural resources and accepting hidden deficiencies in our diets—but not forever. And still the population builds up. The absolute population of Europe, in spite of the most scientific genocide, *increased* during the war. Recent studies show that the United States would consider the work of such men as Tarski and Whorf to be far more significant. Actually, it is astonishing what queer traps verbal language will spring on you. For instance, to use a very unoriginal example, the fact that Indo-European languages draw such a sharp grammatical distinction between noun, verb, adjective, adverb, and so on, has led most thinkers up till quite recently to assume more or less unconsciously that there must be an equally sharp distinction between a thing itself, what it does, what it is like, et cetera—to assume that qualities somehow partake of the nature of substance—and so on to the vast confusion of Western science and philosophy. At that, we're better off than some linguistic groups. I'm told that Chinese, for instance, is hopelessly ill-adapted to expressing technical concepts, so that Chinese scientists are almost forced to think and converse in some language like English. Too bad there never was an Oriental Aristotle; be interesting to see what he'd have come up with in his native language. (Or—wait—could language be the reason why he never appeared?) I wonder if the innovators of the Neolithic—ship,

wheel, metalworking, half a hundred other things all in a few centuries—spoke an inflected language?

One might think that symbolic logic represented a way out, a perfectly generalized language. No such luck. Pure—as distinguished from applied—logic and mathematics are not languages in any ordinary sense, being entirely tautologous, factually empty. The string of symbols "p ⊃ q" or "2+2=4" is just that, empty symbols devoid of either truth or falsity, until I define them by some such means as "Let p stand for the proposition 'There are bug-eyed monsters on Mars'"—and then we're right back in the realm of verbal language. Logic and mathematics will show with great precision exactly

what the whole content and implication of our initial premises are, but nothing else—and those premises have to be given factual meaning in science, population is not only still growing, but that the rate of growth is still going up. There may be a third derivative, for all I know—

And what good are these teeming masses, to themselves or anyone else? Heaven only knows—I don't. They aren't even useful in war—an overpopulated country hasn't the resources or energy to spare to fight effectively, *vide* India. Certainly they don't do much of value except, at best, feed themselves. They can't, they don't have the chance, and it's all the fault of a society which seems to place human quantity before hu-

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What is needed is not a bang-up war but an intelligent birth control program which will, by simply reducing the birth rate below the death rate for a generation or two, bring world population down to a sane level. We could have such a program in our own country right now, and by setting an example and reaping the obvious rewards cause many other nations to follow. The program need not be compulsory in any way. Actual experience has shown that people need nothing but education and availability of means to take advantage. Well, I may be oversimplifying a bit, but not too much. A better and more comprehensive study of the whole question—though some of its data are obsolete, and as a second-generation American I resent its cracks about immigrants—may be found in Burch and Pendell's "Human Breeding and Survival," available in pocket book form now. Vogt and Osborn are virtual bibles on the subject, especially the former.

Sorry, Mr. Vincent. I didn't mean to jump on you with both feet. In fact, I'm grateful to you for giving me an excuse to ride my own hobby-horse.

I'd like to throw in a few comments on the comments about speech and thought-patterns. Personally, I consider Korzybski rather overrated—as a friend of mine once remarked, his system seems to be little more than the triumphant discovery of the obvious—and phrased in language.

THE END.

It's unfair to attack verbal language for being so ambiguous, though. It is vague precisely because it has to cover so broad an area. From the emotional heights of "Hamlet" to the latest and dullest description of an electronic valve is quite a jump. In practice, sub-languages or dialects do grow up, of course, so that each branch of human thought has its own terminology. But the basic grammatical structure with all its philosophical implications is always there.

Some attempt has been made to devise a generalized language, though I don't know with what success. I've been unable to get a copy of Haeml's "*Sprache und Erkenntnistehre*," which I'm told is the best such effort so far—can anyone help me out? Incidentally, my informant adds that Haeml anticipated the methodology and some of the results of dianetics, which interests me. I'm reserving opinion on Hubbard's work till I get a chance to try it for myself, but there are certain intriguing implications, not gone into in the book, of his methodology which would bear further investigation.

Finally, Mr. Campbell, how about putting *Brass Tacks* back in small type?—Poul Anderson.

I think we have the makings of a really hot debate on hand. But be it known: Ye Ed stands strictly on the sidelines on method, agreeing solely with the goal: more Better human beings!

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