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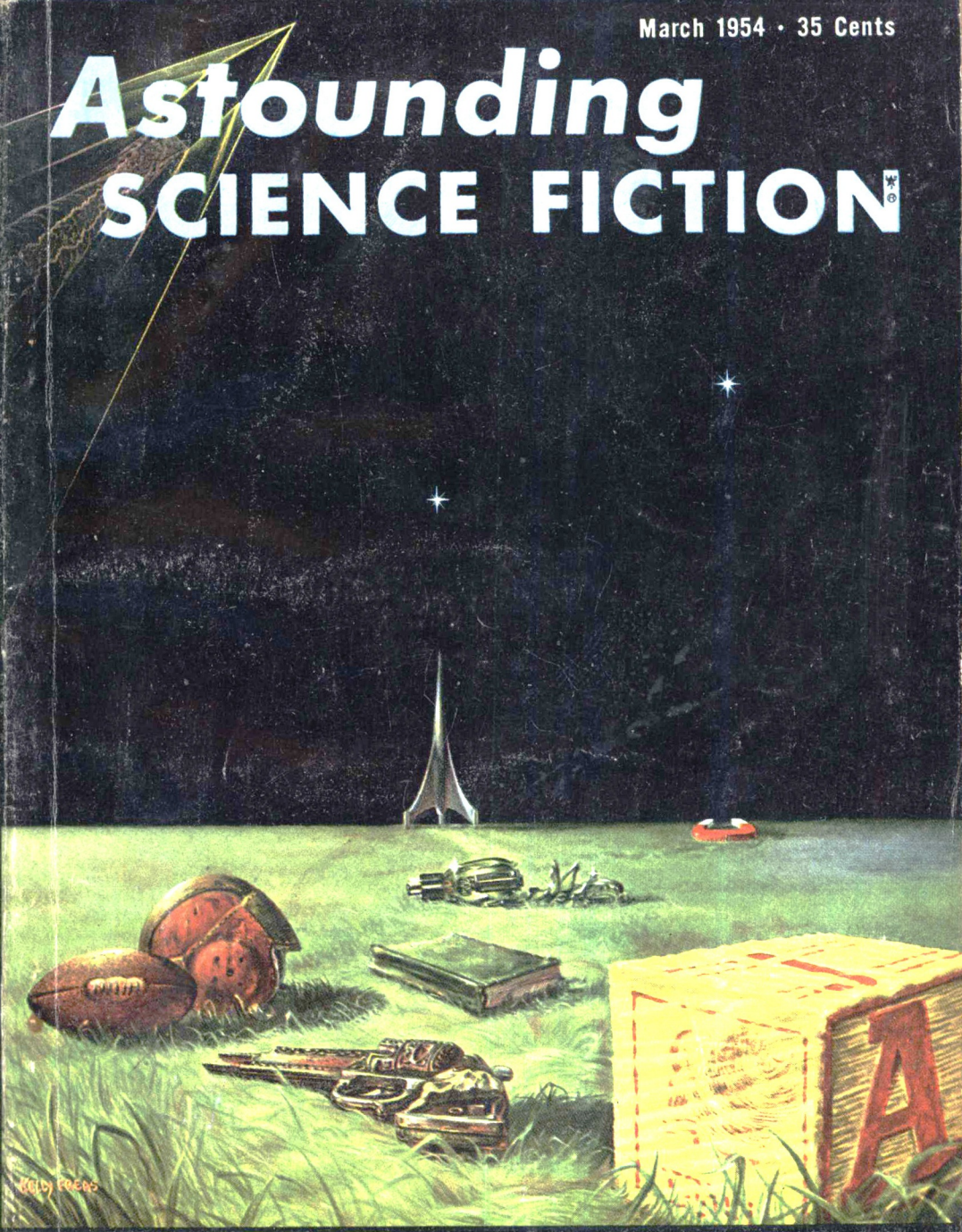

Immigration BY CLIFFORD D. SIMAK

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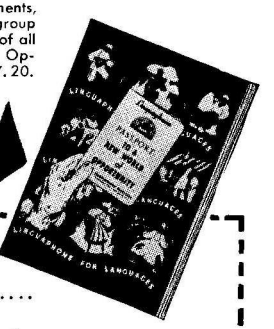

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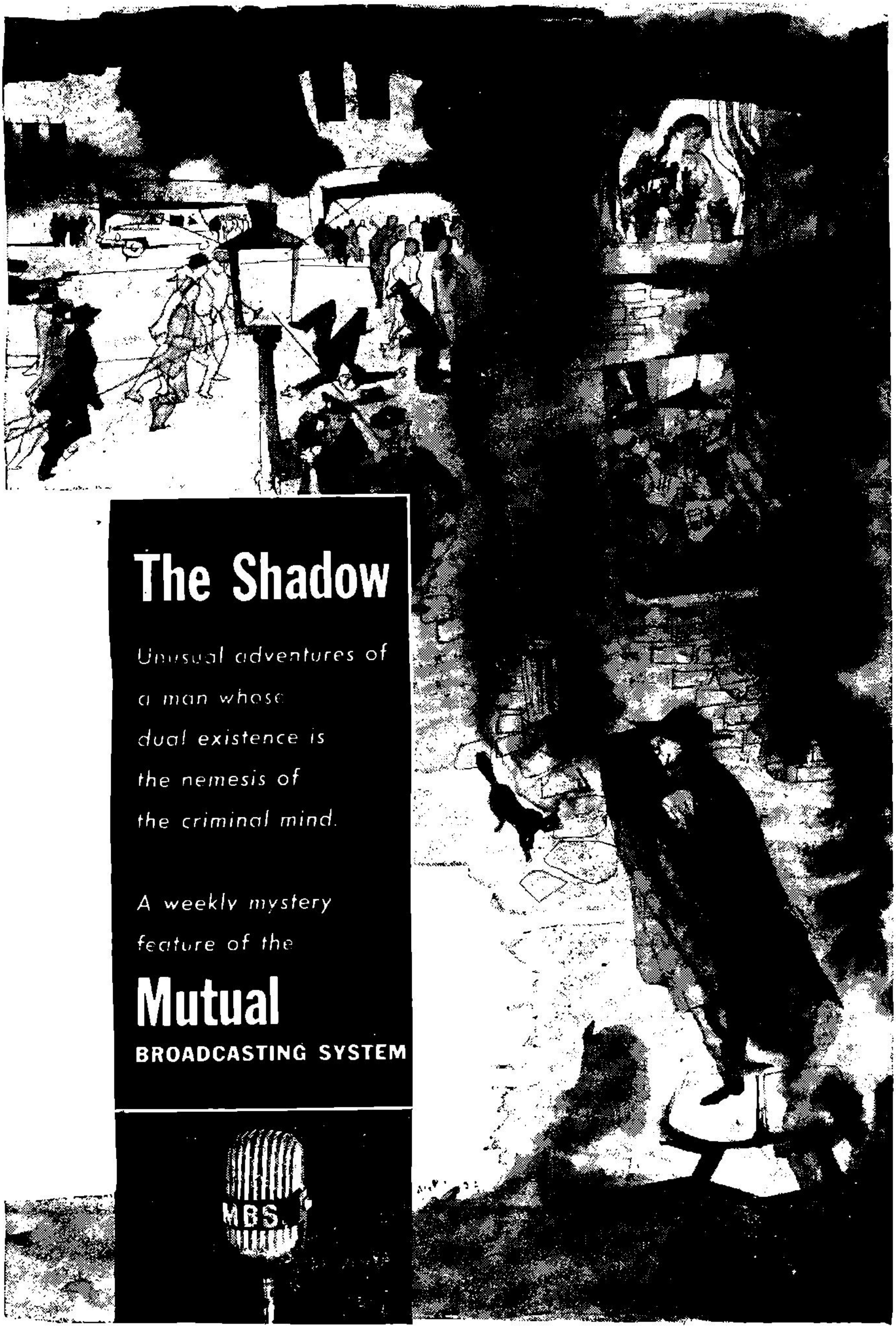
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VOLUME LIII • NUMBER 1 **March 1954**

Short Novel

Immigrant . . . . . *Clifford D. Simak* 8

Novelette

Final Exam . . . . . *Arthur Zirul* 65

Short Story

I Made You . . . . . *Walter M. Miller, Jr.* 55

Serial

Sucker Bait (Conclusion) . . . . . *Isaac Asimov* 111

Articles

Topology . . . . . *J. G. Hocking* 96
Spacesuit Helmet 140

Readers' Departments

The Editor's Page. 5
In Times to Come 95
The Analytical Laboratory 141
Brass Tacks 142
The Reference Library. . . . . *P. Schuyler Miller* 150

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LIMITATION ON LOGIC

From the strong response in letters received after the recent editorial on logic, I gather you like questioning the whole subject. Obviously, I do too. So . . . let's try another approach, and see if we can't find something somewhat different from either the A or non-A business.

Let's define *logic* as "one of the methods of rational thinking." Conventionally, "logical" and "rational" have been considered synonymous; evidently that's stretching the meaning of logic quite a bit, or else using an exceedingly peculiar definition that's based on the individual's viewpoint on the matter at a particular time and/or place. I suggest that there are several other methods of rational thinking, and that *neither* Aristotelian *nor* non-A is adequate—that, in other words, logic is necessary but not sufficient.

You can get some most peculiar effects from considering data that is true, and nothing but the truth. For instance, it is perfectly true that I habitually come from my suburban home into New York City floating about four feet off the ground. I don't come down to Earth—and that's a true statement.

The fact that there's a train between me and the ground is, however, the rest of the truth. Frequently the truth and nothing but the truth is a particularly vicious kind of lie, because it can not be disproven or attacked in any way. I could, for instance, get twenty or thirty witnesses to confirm my statement that I came into New York without once touching Earth, and no witness could be found who could testify otherwise.

Logic has been based on the use of high-probability data; actually, the concept "true" and "false" can be interpreted as "probability of truth equals 1.000" and "probability of truth equals zero." It's mighty easy to evaluate data when the data can be classified in that nice, easy, put-up-or-shut-up manner. A relay is either open or closed—provided the contacts aren't dirty, and haven't welded together. A man is either alive or dead—until we find out how to suspend animation. A star either is visible out there in space, or it isn't —unless it's one of an eclipsing binary pair.

The unfortunate fact of the Universe is that, as Information Theory shows, the real physical Universe

contains noise, and always will contain noise. There is *no* statement of Probability 1.000, and *no* statement of Probability Zero—save in the non-physical system of theoretical discussion.

The interesting and necessary conclusion from that fact is that mathematics, like Euclidean geometry, does not apply to the real Universe; mathematics is a noise-free system, and therefore cannot be congruent with the real, noise-containing Universe. And there cannot ever be any *exact* science that is congruent with the real Universe. No computing machine can ever be built which is both constructed of real physical components, and is congruent with the system of mathematics; the machine can only be tangential to the field of mathematics, because it, being physical, must contain noise, while the system of mathematics does not.

One consequence of that is that any real physical computer will, inevitably, have breakdowns. The observed fact is that they do!

Now I have done a great deal of my thinking on the basis of inadequate data, inaccurate data, using as data the fact that there was a lack-of-data, and that the data-is-inadequate. In the field of logic, which has been confined to high-probability data, that sounds like a prescription for "How to think in a sloppy and improper manner." It isn't. But it will get you into some highly frustrating arguments, since the method of thinking involved *is not accepted generally*.

Consider this: An ordinary silk thread cannot support the weight of an automobile. This is an easily demonstrated fact. I can prove, then, that this specific thread, #1, cannot do it. Neither can thread #2, which I can test and prove inadequate. Neither can thread #3, which likewise fails under test. Nor thread #4, #5, #6, . . . #n. You see, I have proven that there is not one single bit of evidence which you can show me that silk thread will support an automobile. I can break down every single piece of evidence you bring up. Not one of those one hundred thousand threads you brought up as evidence that silk could support an automobile would actually stand up on examination, and that proves that you cannot lift an automobile with a silk cable.

I suggest that, in addition to the standard, conventional logical argument, there is also a quite different thing—the *gestalt* argument. The argument in which there is not one single argument of any useful strength—but in which there are many, many lines of argument which, as a gestalt, are more powerful than any single argument could be!

This is argument based on barely significant data, improbable data, inaccurate or inadequate data—which is, none the less, a completely sound

argument. In terms of probability, it can be put this way:

Suppose there are ten steps, a sequence of ten dependent events. Each individual step has a probability of 0.1. We can represent this as "if A, then (0.1 B):: if B, then (0.1 C):: if. . . ." et cetera.

Now in such an event sequence of ten steps, the product probability of the tenth step will be 10^{-10}—one chance in ten billion.

The above argument is a logical argument—i.e., a one-line-of-development argument. But let's consider a gestalt argument on the same subject.

It's true that the probabilities are such that "if A, 0.1B" applies on one line of development. But it happens that there is also "if A, then (0.05A')" and also "if A, then (0.08 A")) and "if A' or A", then (0.5B)" applies. And in addition, there are several other sequences involving A-to-A'-A"-to-B and a lot of other routes. In addition, there are various crossovers from B to side-chains that also lead to C. In fact, careful investigation reveals that there are, actually, ten trillion different possible lines down the whole ten-event sequence, no one of them having a probability higher than 10^{-10}th—but the summated probability products turn out to have a value of 0.99!

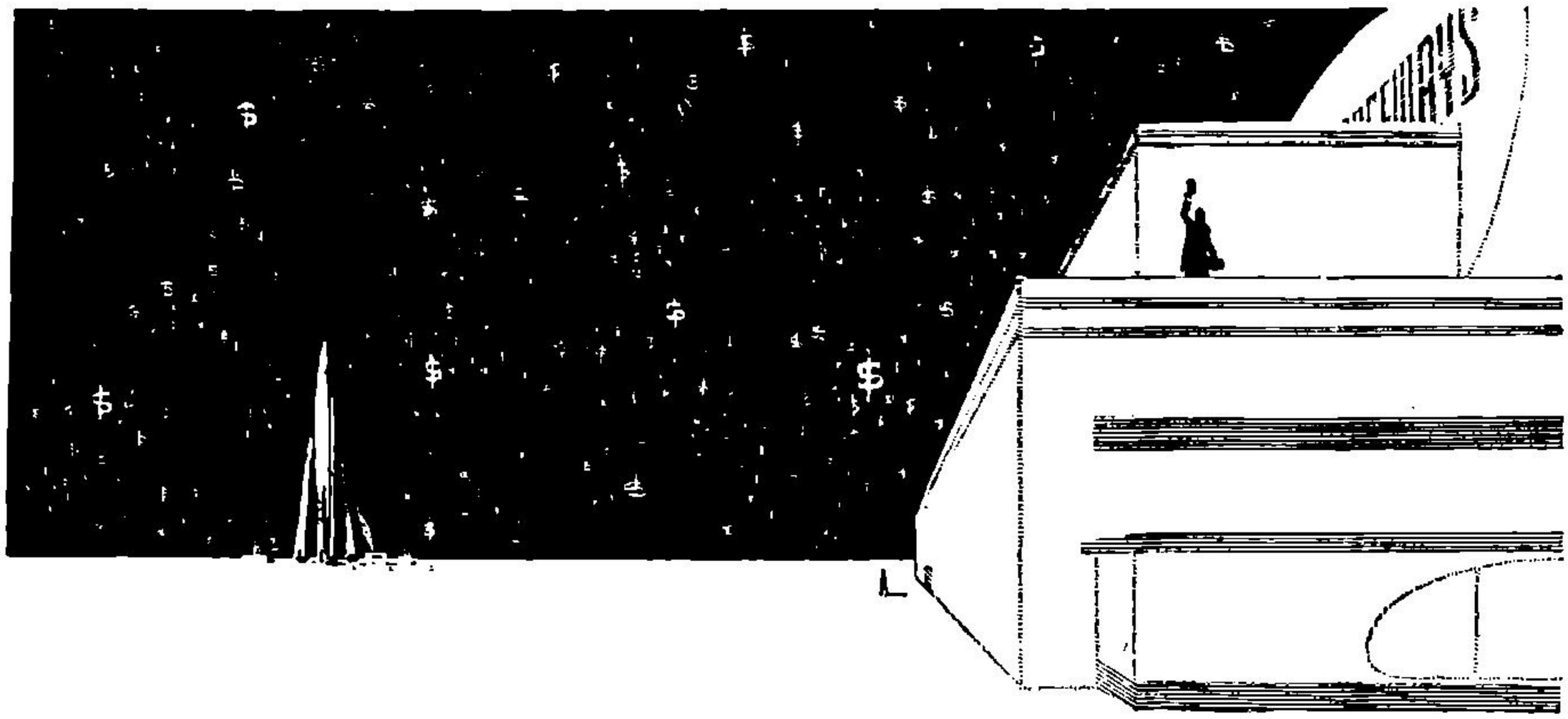
Now a chain is as strong as its weakest link—because it's a single-line development. Logic operates on that principle, and a logical argument can be completely shattered by breaking any one link in the sequence.

But a cable doesn't have links; breaking any one strand does not break the cable. And a gestalt argument doesn't depend on any single link, or any single line of development. Like the fibrous construction so typical of the strength of living things, each line of development is independent, but interactive; it will not shatter under stress, but is capable of elasticity. It can't be handled very easily by a mathematical process, because it's a noise-filled system; it's so interactive that breaking one line of development interacts to put more stress on the other lines of development. Many times blocking of one line of development simply increases the probability of another, while at other times, blocking one decreases adjoining and subsequent probabilities.

Gestalt argument methods simply haven't been formulated, and can't, at present, be described in detail. We're stuck with that. But we must, also, recognize that logic is the truth, and nothing but the truth—but a lie, if we don't recognize that it is not the whole truth.

In addition to gestalt arguments based on multiple-channel low-probability developments, there is a third method of rational thinking that has not been adequately formulated, but

(Continued on page 162)



IMMIGRANT

After many years of work, the child graduates from grammar school—and is a freshman in high school. After more years of work—he gets to be a freshman again. And if he is very, very wise, he might even get to be a kindergarten student again . . .

BY CLIFFORD D. SIMAK

Illustrated by Kelly Freas

He was the only passenger for Kimon and those aboard the ship lionized him because he was going there.

To land him at his destination the ship went two light-years out of its way, an inconvenience for which his passage money, much as it had seemed to him when he'd paid it back on Earth, did not compensate by half.

But the captain did not grumble.

It was, he told Selden Bishop, an honor to carry a passenger for Kimon.

The businessmen aboard sought him out and bought him drinks and lunches and talked expansively of the markets opening up in the new-found solar systems.

But despite all their expansive talk, they looked at Bishop with half-veiled envy in their eyes and they said to him: "The man who cracks this Kimon situation is the one who'll have it big."

One by one, each of them contrived to corner him for private conversations and the talk, after the first drink, always turned to billions if he ever needed backing.

Billions—while he sat there with less than twenty credits in his pocket, living in terror against the day when he might have to buy a round of drinks. For he wasn't certain that his twenty credits would stretch to a round of drinks.

The dowagers towed him off and tried to mother him; the young things lured him off and did not try to mother him. And everywhere he went, he heard the whisper behind the half-raised hand:

"To Kimon!" said the whispers. "My dear, you know what it takes to go to Kimon! An I.Q. rating that's positively fabulous and years and years of study and an examination that not one in a thousand passes."

It was like that all the way to Kimon.

II.

Kimon was a galactic El Dorado, a never-never land, the country at the rainbow's foot. There were few who did not dream of going there, and there were many who aspired, but those who were chosen were a very small percentage of those who tried to make the grade and failed.

Kimon had been reached—either discovered or contacted would be the wrong word to use—more than a hundred years before by a crippled spaceship out of Earth which landed on the planet, lost and unable to go farther.

To this day no one knew for sure exactly what had happened, but it is known that in the end the crew destroyed the ship and settled down on Kimon and had written letters home saying they were staying.

Perhaps the delivery of those letters, more than anything else, convinced the authorities of Earth that Kimon was the kind of place the letters said it was—although later on there was other evidence which weighed as heavily in the balance.

There was, quite naturally, no mail service between Kimon and Earth, but the letters were delivered, and in a most fantastic, although when you think about it, a most logical way. They were rolled into a bundle and placed in a sort of tube, like the pneumatic tubes that are used in industry for interdepartmental communication and the tube was delivered, quite

neatly, on the desk of the World Postal chief in London. Not on the desk of a subordinate, mind you, but on the desk of the chief himself. The tube had not been there when he went to lunch; it was there when he came back, and so far as could be determined, despite a quite elaborate investigation, no one had been seen to place it there.

In time, still convinced that there had been some sort of hoax played, the postal service delivered the letters to the addressees by special messengers who in their more regular employment were operatives of the World Investigative Bureau.

The addressees were unanimous in their belief the letters were genuine, for in most cases the handwriting was recognized and in every letter there were certain matters in the context which seemed to prove that they were *bona fide*.

So each of the addressees wrote a letter in reply and these were inserted in the tube in which the original letters had arrived and the tube was placed meticulously in the exact spot where it had been found on the desk of the postal chief.

Then everyone watched and nothing happened for quite some time, but suddenly the tube was gone and no one had seen it go—it had been there one moment and not there the next.

There remained one question and that one soon was answered. In the matter of a week or two the tube reappeared again, just before the end of office hours. The postal chief had been working away, not paying much attention to what was going on, and suddenly he saw that the tube had come back again.

Once again it held letters and this time the letters were crammed with sheafs of hundred-credit notes, a gift from the marooned spacemen to their relatives, although it should be noted immediately that the spacemen themselves probably did not consider that they were marooned.

The letters acknowledged the receipt of the replies that had been sent from Earth and told more about the planet Kimon and its inhabitants.

And each letter carefully explained how come they had hundred-credit notes on Kimon. The notes as they stood, the letters said, were simply counterfeits, made from bills the spacemen had in their pockets, although when Earth's fiscal experts and the Bureau of Investigation men had a look at them there was no way in which you could tell them from the real thing.

But, the letters said, the Kimonian government wished to make right the matter of the counterfeiting. To back the currency the Kimonians, within the next short while, would place on deposit with the World bank materials not only equivalent to their value, but enough additional to set up a balance against which more notes could be issued.

There was, the letters explained, no money as such on Kimon, but since Kimon was desirous of employing the men from Earth, there must be some way to pay them, so if it was all right with the World bank and everyone else concerned . . .

The World bank did a lot of hemming and hawing and talked about profound fiscal matters and deep economic principles, but all this talk dissolved to nothing when in the matter of a day or two several tons of carefully shielded uranium and a couple of bushels of diamonds were deposited, during the afternoon coffee hour, beside the desk of the bank's president.

With evidence of this sort, there was not much that Earth could do except accept the fact that the planet Kimon was a going concern, that the Earthmen who had landed there were going to stay, and to take the entire situation at face value.

The Kimonians, the letters said, were humanoid and had parapsychic powers and had built a culture which was miles ahead of Earth or any other planet so far discovered in the galaxy.

Earth furbished up a ship, hand-picked a corps of its most persuasive diplomats, loaded down the hold with expensive gifts, and sent the whole business out to Kimon.

Within minutes after landing, the diplomats had been quite undiplomatically booted off the planet. Kimon, it appeared, had no desire to ally itself with a second-rate, barbaric planet. When it wished to establish diplomatic relationships it would say so. Earth people might come to Kimon if they wished and settle there, but not just any Earth person. To come to Kimon, the individual would have to possess not only a certain minimum I.Q., but must also have an impressive scholastic record.

And that was the way it was left.

You did not go to Kimon simply because you wish to go there; you worked to go to Kimon.

First of all, you had to have the specified I.Q. rating and that ruled out ninety-nine per cent or better of Earth's population. Once you had passed the I.Q. test, you settled down to grueling years of study, and at the end of the years of study you wrote an examination and, once again, most of the aspirants were ruled out. Not more than one in a thousand who took the examinations passed.

Year after year, Earth men and women dribbled out to Kimon, settled there, prospered, wrote their letters home.

Of those who went out, none came back. Once you had lived on Kimon, you could not bear the thought of going back to Earth.

And yet, in all those years, the sum of knowledge concerning Kimon, its inhabitants and its culture, was very slight indeed. What knowledge there

was, the only knowledge that there was, was compiled from the letters delivered meticulously once each week to the desk of the postal chief in London.

The letters spoke of wages and salaries a hundred times the wage and salary that was paid on Earth, of magnificent business opportunities, of the Kimonian culture and the Kimonians themselves, but in no detail, of culture or of business or any other factor, were the letters too specific.

And perhaps the recipients of the letters did not mind too much the lack of specific information, for almost every letter carried with it a sheaf of notes, all crisp and new, and very, very legal, backed by tons of uranium, bushels of diamonds, stacked bars of gold and other similar knicknacks deposited from time to time beside the desk of the World bank's president.

It became, in time, the ambition of every family on the Earth to send at least one relative to Kimon, for a relative on Kimon virtually spelled an assured and sufficient income for the rest of the clan for life.

Naturally the legend of Kimon grew. Much that was said about it was untrue, of course. Kimon, the letters protested, did not have streets paved with solid gold, since there were no streets. Nor did Kimonian damsels wear gowns of diamond-dust —the damsels of Kimon wore not much of anything.

But to those whose understanding went beyond streets of gold and gowns of diamonds, it was well understood that in Kimon lay possibilities vastly greater than either gold or diamonds. For here was a planet with a culture far in advance of Earth, a people who had schooled themselves or had naturally developed parapsychic powers. On Kimon one could learn the techniques that would revolutionize galactic industry and communications; on Kimon one might discover philosophy that would set mankind overnight on a new and better—and more profitable?—path.

The legend grew, interpreted by each according to his intellect and his way of thought, and grew and grew and grew . . .

Earth's government was very helpful to those who wished to go to Kimon, for government, as well as individuals, could appreciate the opportunities for the revolution of industry and the evolution of human thought. But since there had been no invitation to grant diplomatic recognition, Earth's government sat and waited, scheming, doing all it could to settle as many of its people on Kimon as was possible. But only the best, for even the densest bureaucrat recognized that on Kimon Earth must put its best foot forward.

Why the Kimonians allowed Earth to send its people was a mystery for which there was no answer. But apparently Earth was the only other planet in the galaxy which had been

allowed to send its people. The Earthmen and the Kimonians, of course, both were humanoid, but this was not an adequate answer, either, for they were not the only humanoids in the galaxy. For its own comfort, Earth assumed that a certain common understanding, a similar outlook, a certain parallel evolutionary trend—with Earth a bit behind, of course—between Earth and Kimon might account for Kimon's qualified hospitality.

But be that as it may, Kimon was a galactic El Dorado, a never-never land, a place to get ahead, the place to spend your life, the country at the rainbow's end.

III.

Selden Bishop stood in the parklike area, where the gig had landed him, for Kimon had no spaceports, as it likewise failed in having many other things.

He stood, surrounded by his luggage, and watched the gig drive spaceward to rendezvous with the liner's orbit.

When he could see the gig no longer, he sat down on one of his bags and waited.

The park was faintly Earthlike, but the similarity was only in the abstract, for in each particular there was a subtle difference that said this was an alien planet. The trees were too slim and the flowers just a shade too loud and the grass was off a shade or two from the grass you saw on Earth. The birds, if they were birds, were more lizardlike than the birds of Earth and their feathers were put on wrong and weren't quite the color one associated with plumage. The breeze had a faint perfume upon it that was no perfume of Earth, but an alien odor that smelled like a color looked and Bishop tried to decide, but couldn't, which color it might be.

Sitting on his bag, in the middle of the park, he tried to drum up a little enthusiasm, tried to whistle up some triumph that he finally was on Kimon, but the best that he could achieve was a thankfulness that he'd made it with the twenty still intact.

He would need a little cash to get along on until he could find a job. But, he told himself, he shouldn't have to wait too long before he found a job. The thing, of course, was not to take the first one offered him, but to shop around a little and find the one for which he was best fitted. And that, he knew, might take a little time.

Thinking of it, he wished that he had more than a twenty. He should have allowed himself a bigger margin, but that would have meant something less than the best luggage he could buy and perhaps not enough of it, off-the-rack suits instead of tailored, and all other things accordingly.

It was, he told himself, important that he make the best impression, and sitting there and thinking it over, he couldn't bring himself to regret the

money he had spent to make a good impression.

Maybe he should have asked Morley for a loan. Morley would have given him anything he asked and he could have paid it back as soon as he got a job. But he had hated to ask, for to ask, he now admitted, would have detracted from his new-found importance as a man who had been selected to make the trip to Kimon. Everyone, even Morley, looked up to a man who was set to blast for Kimon, and you couldn't go around asking for a loan or for other favors.

He remembered the last visit he had with Morley, and looking back at it now, he saw that while Morley was his friend, that last visit had a flavor, more or less, of a diplomatic job that Morley had to carry out.

Morley had gone far and was going farther in the diplomatic service. He looked like a diplomat and he talked like one and he had a better grasp, old heads at the department said, of Sector Nineteen politics and economics than any of the other younger men. He wore a clipped mustache that had a frankly cultivated look and his hair was always quite in place and his body, when he walked, was like a panther walking.

They had sat in Morley's diggings and had been all comfortable and friendly and then Morley had gotten up and paced up and down the room with his panther walk.

"We've been friends for a long, long time," said Morley. "We've been in lots of scrapes together."

And the two of them had smiled, remembering some of the scrapes they had been in together.

"When I heard you were going out to Kimon," Morley said, "I was pleased about it naturally. I'd be pleased at anything that came your way. But I was pleased, as well, for another reason. I told myself here finally was a man who could do a job and find out what we want."

"What do you want?" Bishop had asked and, as he remembered it, he had asked it as if he might be asking whether Morley wanted Scotch or bourbon. Although, come to think of it, he never would have asked that particular question, for all the young men in the alien relations section religiously drank Scotch. But, anyhow, he asked it casually, although he sensed that there was nothing casual at all about the situation.

He could smell the scent of cloak and dagger and he caught a sudden glimpse of huge official worry and for an instant he was a little cold and scared.

"There must be some way to crack that planet," Morley had told him, "but we haven't found it yet. So far as the Kimonians are concerned, none of the rest of us, none of the other planets, officially exist. There's not a single planet accorded diplomatic status. On Kimon there is not a single

official representative of any other people. They don't seem to trade with anyone, and yet they must trade with someone, for no planet, no culture can exist in complete self-sufficiency. They must have diplomatic relations somewhere, with someone. There must be some reason, beyond the obvious one that we are an inferior culture, why they do not recognize Earth. For even in the more barbaric days of Earth there was official recognition of many governments and peoples who were cultural inferiors to the recognizing nation."

"You want me to find out all this?"

"No," said Morley. "Not all that. All we want are clues. Somewhere there is the clue that we are looking for, the hint that will tell us what the actual situation is. All we need is the opening wedge—the foot in the door. Give us that and we will do the rest."

"There have been others," Bishop told him. "Thousands of others. I'm not the only one who ever went to Kimon."

"For the last fifty years or more," said Morley, "the section has talked to all the others, before they went out, exactly as I'm talking to you now."

"And you've gotten nothing?"

"Nothing," said Morley. "Or almost nothing. Or nothing, anyhow, that counted or made any sense."

"They failed—"

"They failed," Morley told him, "because once on Kimon they forgot about Earth . . . well, not forgot about it, that's not entirely it. But they lost all allegiance to it. They were Kimon-blinded."

"You believe that?"

"I don't know," said Morley. "It's the best explanation that we have. The trouble is that we talk to them only once. None of them come back. We can write letters to them, certainly. We can try to jog them—indirectly, of course. But we can't ask them outright."

"Censorship?"

"Not censorship," said Morley, "although they may have that, too; but mostly telepathy. The Kimonians would know if we tried to impress anything too forcibly upon their minds. And we can't take the chance of a single thought undoing all the work that we have done."

"But you're telling me."

"You'll forget it," Morley said. "You will have several weeks in which you can forget it—push it to the back of your mind. But not entirely—not entirely."

"I understand," Bishop had told him.

"Don't get me wrong," said Morley. "It's nothing sinister. You're not to look for that. It may be just a simple thing. The way we comb our hair. There's some reason—perhaps many little ones. And we must know those reasons."

Morley had switched it off as quickly as he had begun it, had poured

another round of drinks, had sat down again and talked of their school days and of the girls they'd known and of week-ends in the country.

It had been, all in all, a very pleasant evening.

But that had been weeks ago, and since then he'd scarcely remembered it and now here he was on Kimon, sitting on one of his bags in the middle of a park, waiting for a welcoming Kimonian to show up.

All the time that he'd been waiting, he had been prepared for the Kimonian's arrival. He knew what a Kimonian looked like and he should not have been surprised.

But when the native came, he was.

For the native was six foot, ten, and almost a godlike being, a sculptered humanoid who was, astonishingly, much more human than he had thought to find.

One moment he had sat alone in the little parklike glade and the next the native was standing at his side.

Bishop came to his feet and the Kimonian said, "We are glad you are here. Welcome to Kimon, sir."

The native's inflection was as precise and beautiful as his sculptered body.

"Thank you," Bishop said, and knew immediately that the two words were inadequate and that his voice was slurred and halting compared with the native's voice. And, looking at the Kimonian, he had the feeling that by comparison, he cut a rumpled, seedy figure.

He reached into his pocket for his papers and his fingers were all thumbs, so that he fumbled for them and finally dug them out—dug is the word exactly—and handed them to the waiting being.

The Kimonian flicked them—that was it, flicked them—then he said, "Mr. Selden Bishop. Very glad to know you. Your I.Q. rating, 160, is very satisfactory. Your examination showing, if I may say so, is extraordinary. Recommendations good. Clearance from Earth in order. And I see you made good time. Very glad to have you."

"But—" said Bishop. Then he clamped his mouth tight shut. He couldn't tell this being he'd merely flicked the pages and could not possibly have read them. For, obviously, he had.

"You had a pleasant flight, Mr. Bishop?"

"A most pleasant one," said Bishop and was filled with sudden pride that he could answer so easily and urbanely.

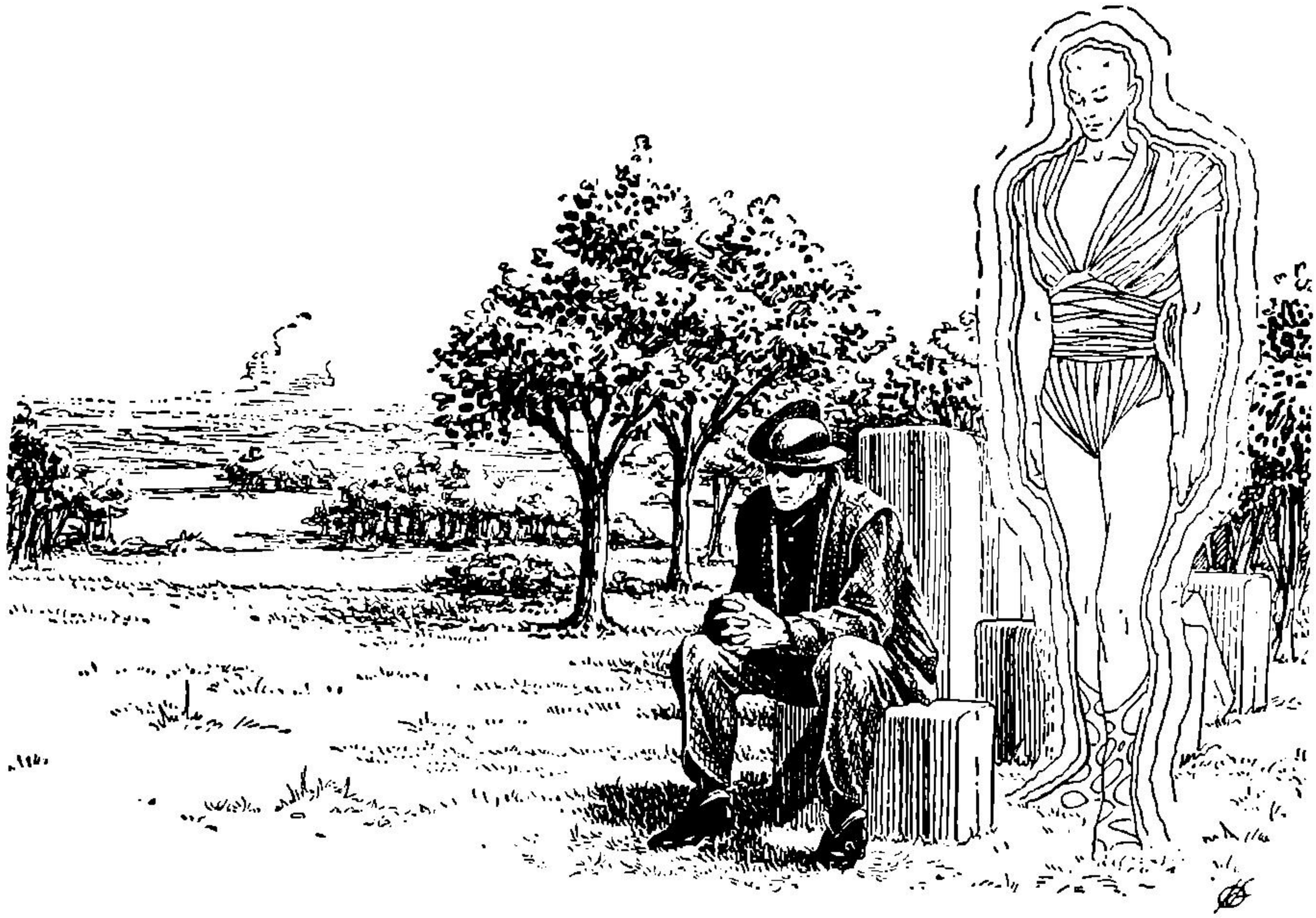
"Your luggage," said the native, "is in splendid taste."

"Why, thank you—" then was filled with rage. What right had this person to patronize his luggage!

But the native did not appear to notice.

"You wish to go to the hotel?"

"If you please," said Bishop, speak-



ing very tightly, holding himself in check.

"Please allow me," said the native.

Bishop blurred for just a second—a definite sense of blurring—as if the universe had gone swiftly out of focus, then he was standing, not in the park-like glade, but in a one-man-sized alcove off a hotel lobby, with his bags stacked neatly beside him.

IV.

He had missed the triumph before, sitting in the glade, waiting for the native, after the gig had left him, but now it struck him, a heady, drunken triumph that surged through his body and rose in his throat to choke him.

This was Kimon! He finally was on Kimon! After all the years of study, he finally was here—the fabulous place he'd worked for many years to reach.

A high I.Q., they'd said behind their half-raised hands—a high I.Q. and many years of study, and a stiff examination that not more than one in every thousand passed.

He stood in the alcove, with the sense of hiding there, to give himself a moment in which to regain his breath at the splendor of what had finally come to pass, to gain the moment it would take for the unreasoning triumph to have its way with him and go.

For the triumph was something

that must not be allowed to last. It was something that he must not show. It was a personal thing and as something personal it must be hidden deep.

He might be one of a thousand back on Earth, but here he stood on no more than equal footing with the ones who had come before him. Perhaps not quite on equal footing, for they would know the ropes and he had yet to learn them.

He watched them in the lobby—the lucky and the fabulous ones who had preceded him, the glittering company he had dreamed about during all the weary years—the company that he presently would join, the ones of Earth who were adjudged fit to go to Kimon.

For only the best must go—the best and smartest and the quickest. Earth must put her best foot forward, for how otherwise would Earth ever persuade Kimon that she was a sister planet?

At first the people in the lobby had been no more than a crowd, a crowd that shone and twinkled, but with that curious lack of personality which goes with a crowd. But now, as he watched, the crowd dissolved into individuals and he saw them, not as a group, but as the men and women he presently would know.

He did not see the bell captain until the native stood in front of him, and the bell captain, if anything, was taller and more handsome than the man who'd met him in the glade.

"Good evening, sir," the captain said. "Welcome to the Ritz."

Bishop started. "The Ritz? Oh, yes, I had forgotten. This place is the Ritz."

"We're glad to have you with us," said the captain. "We hope your stay will prove to be a long one."

"Certainly," said Bishop. "That is, I hope so, too."

"We had been notified," the captain said, "that you were arriving, Mr. Bishop. We took the liberty of reserving rooms for you. I trust they will be satisfactory."

"I am sure they will be," Bishop said.

As if anything on Kimon could be unsatisfactory!

"Perhaps you will want to dress," the captain said. "There still is time for dinner."

"Oh, certainly," said Bishop. "Most assuredly I will."

And wished he had not said it.

"We'll send up the bags," the captain said. "No need to register. That is taken care of. If you'll permit me, sir."

V.

The rooms were satisfactory

There were three of them.

Sitting in a chair, Bishop wondered how he'd ever pay for them.

Remembering the lonely twenty credits, he was seized with a momentary panic.

He'd have to get a job sooner than he planned, for the twenty credits wouldn't go too far with a layout like this one. Although he supposed if he asked for credit it would be given him.

But he recoiled from the idea of asking for credit, of being forced to admit that he was short of cash. So far he'd done everything correctly. He'd arrived aboard a liner and not a battered trader; his luggage—what had the native said?—was in splendid taste; his wardrobe was all that could be expected; and he hoped that he'd not communicated to anyone the panic and dismay he'd felt at the luxury of the suite.

He got up from the chair and prowled about the room. There was no carpeting, for the floor itself was soft and yielding and you left momentary tracks as you walked, but they puffed back and smoothed out almost immediately.

He walked over to a window and stood looking out of it. Evening had fallen and the landscape was covered with a dusty blue—and there was nothing, absolutely nothing, but rolling countryside. There were no roads that he could see and no lights that would have told of other habitations.

Perhaps, he thought, I'm on the wrong side of the building. On the other side there might be streets and roads and homes and shops.

He turned back to the room and looked at it—the Earthlike furniture so quietly elegant that it almost shouted, the beautiful, veined marble fireplace, the shelves of books, the shine of old wood, the matchless paintings hanging on the wall, and the great cabinet that filled almost one end of the room.

He wondered what the cabinet might be. It was a beautiful thing, with an antique look about it and it had a polish—not a wax, but of human hands and time.

He walked toward it.

The cabinet said: "Drink, sir?"

"I don't mind if I do," said Bishop, then stopped stock-still, realizing that the cabinet had spoken and he had answered it.

A panel opened in the cabinet and the drink was there.

"Music?" asked the cabinet.

"If you please," said Bishop.

"Type?"

"Type? Oh, I see. Something gay, but maybe just a little sadness too. Like the blue hour of twilight spreading over Paris. Who was it used that phrase? One of the old writers. Fitzgerald. I'm sure it was Fitzgerald."

The music told about the blue hour stealing over that city far away on Earth and there was soft April rain and distant girlish laughter and the shine of the pavement in the slanting rain.

"Is there anything else you wish, sir?" asked the cabinet.

"Nothing at the moment."

"Very well, sir. You will have an

hour to get dressed for dinner."

He left the room, sipping his drink as he went—and the drink had a certain touch to it.

He went into the bedroom and tested the bed and it was satisfactorily soft. He examined the dresser and the full-length glass and peeked into the bathroom and saw that it was equipped with an automatic shaver and massager, that it had a shower and tub, an exercising machine and a number of other gadgets that he couldn't place.

And the third room.

It was almost bare by the standards of the other two. In the center of it stood a chair with great flat arms and on each of the arms many rows of buttons.

He approached the chair cautiously, wondering what it was—what kind of trap it was. Although that was foolish, for there were no traps on Kimon. This was Kimon, the land of opportunity, where a man might make a fortune and live in luxury and rub shoulders with an intelligence and a culture that was the best yet found in the galaxy.

He bent down over the wide arms of the chair and found that each of the buttons was labeled. They were labeled "History," "Poetry," "Drama," "Sculpture," "Literature," "Painting," "Astronomy," "Philosophy," "Physics," "Religions" and many other things. And there were several that were labeled with words he'd never seen and had no meaning to him.

He stood in the room and looked around at its starkness and saw for the first time that it had no windows, but was just a sort of box—a theater, he decided, or a lecture room. You sat in the chair and pressed a certain button and—

But there was no time for that. An hour to dress for dinner, the cabinet had said, and some of that hour was already gone.

The luggage was in the bedroom and he opened the bag that held his dinner clothes. The jacket was badly wrinkled.

He stood with it in his hands, staring at it. Maybe the wrinkles would hang out. Maybe—

But he knew they wouldn't.

The music stopped and the cabinet asked: "Is there something that you wish, sir?"

"Can you press a dinner jacket?"

"Surely, sir, I can."

"How soon."

"Five minutes," said the cabinet. "Give me the trousers, too."

VI.

The bell rang and he went to the door.

A man stood just outside.

"Good evening," said the man. "My name is Montague, but they call me Monty."

"Won't you come in, Monty?"

Monty came in and surveyed the room.

"Nice place," he said.

Bishop nodded. "I didn't ask for anything at all. They just gave it to me."

"Clever, these Kimonians," said Monty. "Very clever, yes."

"My name is Selden Bishop."

"Just come in?" asked Monty.

"An hour or so ago."

"All dewed up with what a great place Kimon is."

"I know nothing about it," Bishop told him. "I studied it, of course."

"I know," said Monty, looking at him slantwise. "Just being neighborly. New victim and all that, you know."

Bishop smiled because he didn't quite know what else to do.

"What's your line?" asked Monty.

"Business," said Bishop. "Administration's what I'm aiming at."

"Well, then," Monty said, "I guess that lets you out. You wouldn't be interested."

"In what?"

"In football. Or baseball. Or cricket. Not the athletic type."

"Never had the time."

"Too bad," Monty said. "You have the build for it."

The cabinet asked: "Would the gentleman like a drink?"

"If you please," said Monty.

"And another one for you, sir?"

"If you please," said Bishop.

"Go on and get dressed," said Monty. "I'll sit down and wait."

"Your jacket and trousers, sir," said the cabinet.

A door swung open and there they were, cleaned and pressed.

"I didn't know," said Bishop, "that you went in for sports out here."

"Oh, we don't," said Monty. "This is a business venture."

"Business venture?"

"Certainly. Give the Kimonians something to bet on. They might go for it. For a while at least. You see, they can't bet—"

"I don't see why not—"

"Well, consider for a moment. They have no sports at all, you know. Wouldn't be possible. Telepathy. They'd know three moves ahead what their opponents were about to do. Telekinesis. They could move a piece or a ball or what-have-you without touching a finger to it. They—"

"I think I see," said Bishop.

"So we plan to get up some teams and put on exhibition matches. Drum up as much enthusiasm as we can. They'll come out in droves to see it. Pay admission. Place bets. We, of course, will play the bookies and rake off our commissions. It will be a good thing while it lasts."

"It won't last, of course."

Monty gave Bishop a long look.

"You catch on fast," he said. "You'll get along."

"Drinks, gentlemen," the cabinet said.

Bishop got the drinks, gave one of

them to his visitor.

"You better let me put you down," said Monty. "Might as well rake in what you can. You don't need to know too much about it."

"All right," Bishop told him, agreeably. "Go ahead and put me down."

"You haven't got much money," Monty said.

"How did you know that?"

"You're scared about this room," said Monty.

"Telepathy?" asked Bishop.

"You pick it up," said Monty. "Just the fringes of it. You'll never be as good as they are. Never. But you pick things up from time to time—a sort of sense that seeps into you. After you've been here long enough."

"I had hoped that no one noticed."

"A lot of them will notice, Bishop. Can't help but notice, the way you're broadcasting. But don't let it worry you. We all are friends. Banded against the common enemy, you might say. If you need a loan—"

"Not yet," said Bishop. "I'll let you know."

"Me," said Monty. "Me or anyone. We all are friends. We got to be."

"Thanks."

"Not at all. Now you go ahead and dress. I'll sit and wait for you. I'll bear you down with me. Everyone's waiting to meet you."

"That's good to know," said Bishop. "I felt quite a stranger."

"Oh, my, no," said Monty. "No need to. Not many come, you know. They'll all want to know of Earth."

He rolled the glass between his fingers.

"How about Earth?" he asked.

"How about—"

"Yes, it still is there, of course. How is it getting on? What's the news?"

VII.

He had not seen the hotel before. He had caught a confused glimpse of it from the alcove off the lobby, with his luggage stacked beside him, before the bell captain had showed up and whisked him to his rooms.

But now he saw that it was a strangely substantial fairyland, with fountains and hidden fountain music, with the spidery tracery of rainbows serving as groins and arches, with shimmery columns of glass that caught and reflected and duplicated many times the entire construction of the lobby so that one was at once caught up in the illusion that here was a place that went on and on forever and at the same time you could cordon off a section of it in one's mind as an intimate corner for a group of friends.

It was illusion and substantiality, beauty and a sense of home—it was, Bishop suspected, all things to all men and what you wished to make it. A place of utter magic that divorced one from the world and the crudities of the world, with a gaiety that was not brittle and a sentimentality that

stopped short of being cheap, and that transmitted a sense of well being and of self-importance from the very fact of being a part of such a place.

There was no such place on Earth, there could be no such place on Earth, for Bishop suspected that something more than human planning, more than human architectural skill had gone into its building. You walked in an enchantment and you talked with magic and you felt the sparkle and the shine of the place live within your brain.

"It gets you," Monty said. "I always watch the faces of the newcomers when they first walk in it."

"It wears off after a time," said Bishop, not believing it.

Monty shook his head. "My friend, it does not wear off. It doesn't surprise you quite so much, but it stays with you all the time. A human does not live long enough for a place like this to wear thin and commonplace."

He had eaten dinner in the dining room which was old and solemn, with an ancient other-worldness and a hushed, tiptoe atmosphere, with Kimonian waiters at your elbow, ready to recommend a certain dish or a vintage as one that you should try.

Monty had coffee while he ate and there had been others who had come drifting past to stop a moment and welcome him and ask him of Earth, always using a studied casualness, always with a hunger in their eyes that belied the casualness.

"They make you feel at home," said Monty, "and they mean it. They are glad when a new one comes."

He did feel at home—more at home than he had ever felt in his life before, as if already he was beginning to fit in. He had not expected to fit in so quickly and he was slightly astonished at it—for here were all the people he had dreamed of being with, and he finally was with them. You could feel the magnetic force of them, the personal magnetism that had made them great, great enough to be Kimonworthy, and looking at them, he wondered which of them he would get to know, which would be his friends.

He was relieved when he found that he was not expected to pay for his dinner or his drinks, but simply sign a chit, and once he'd caught onto that, everything seemed brighter, for the dinner of itself would have taken quite a hole out of the twenty nestling in his pocket.

With dinner over and with Monty gone somewhere into the crowd, he found himself in the bar, sitting on a stool and nursing a drink that the Kimonian bartender had recommended as being something special.

The girl came out of nowhere and floated up to the stool beside him and she said:

"What's that you're drinking, friend?"

"I don't know," said Bishop. He made a thumb toward the man behind the bar. "Ask him to make you one."

The bartender heard and got busy with the bottles and the shaker.

"You're fresh from Earth," said the girl.

"Fresh is the word," said Bishop.

"It's not so bad," she said. "That is, if you don't think about it."

"I won't think about it," Bishop promised. "I won't think of anything."

"Of course, you do get used to it," she said. "After a while you don't mind the faint amusement. You think, what the hell, let them laugh all they want to so long as I have it good. But the day will come—"

"What are you talking about?" asked Bishop. "Here's your drink. Dip your muzzle into that and—"

"The day will come when we are old to them, when we don't amuse them any longer. When we become passé. We can't keep thinking up new tricks. Take my painting, for example—"

"See here," said Bishop, "you're talking way above my head."

"See me a week from now," she said. "The name's Maxine. Just ask to see Maxine. A week from now, we can talk together. So long, Buster."

She floated off the stool and suddenly was gone.

She hadn't touched her drink.

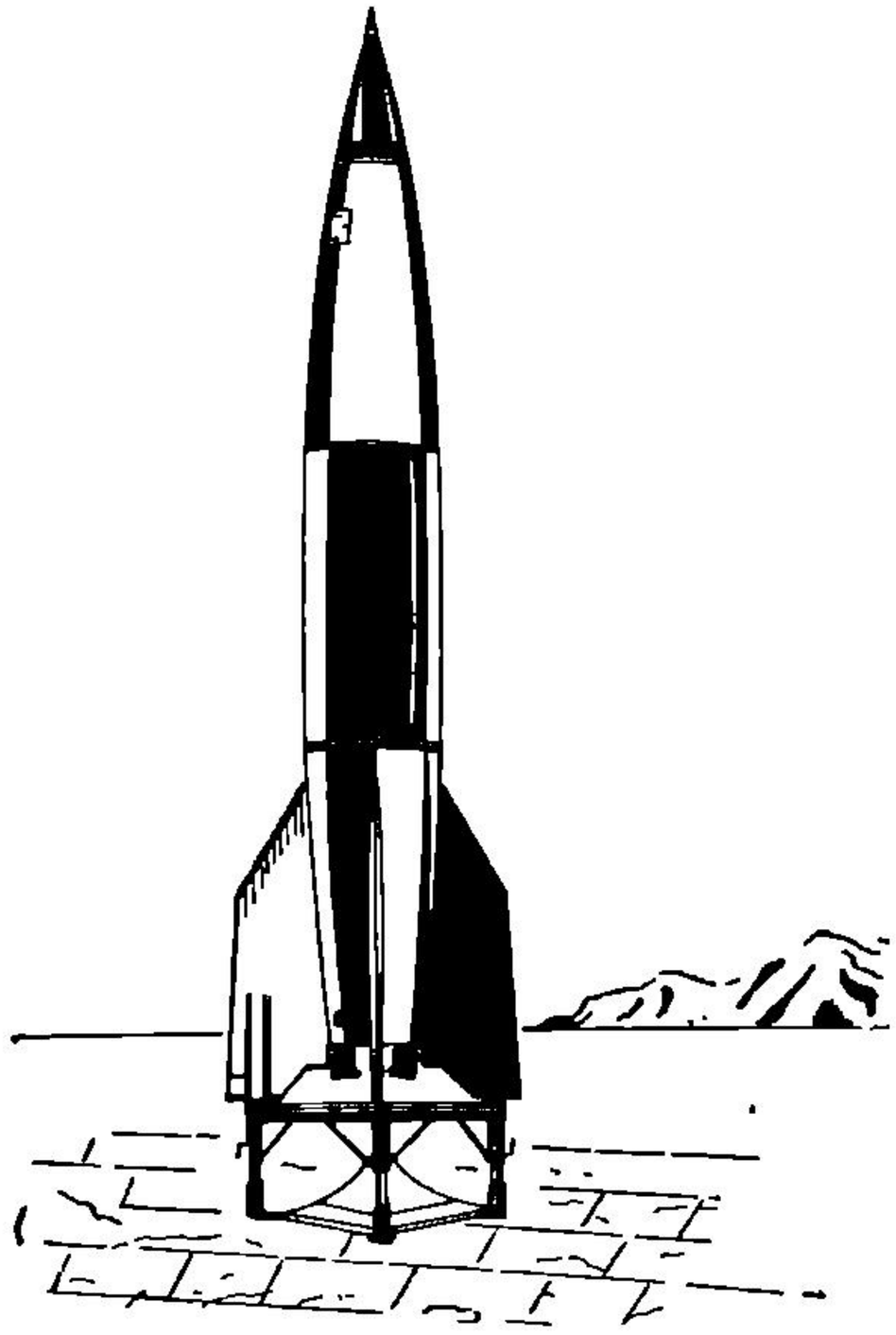
VIII.

He went up to his rooms and stood for a long time at a window, staring out into the featureless landscape lighted by a moon.

Wonder thundered in his brain, the wonder and the newness and the many questions, the breathlessness of finally being here, of slowly coming to a full realization of the fact that he was here, that he was one of that glittering, fabulous company he had dreamed about for years.

The long grim years peeled off him, the years of books and study, the years of determined driving, the hungry, anxious, grueling years when he had lived a monkish life, mortifying body and soul to drive his intellect.

The years fell off and he felt the newness of himself as well as the newness of the scene. A cleanness and a newness and the sudden glory.



The cabinet finally spoke to him.

"Why don't you try the live-it, sir?"

Bishop swung sharply around.

"You mean—"

"The third room," said the cabinet. "You'll find it most amusing."

"The live-it!"

"That's right," said the cabinet. "You pick it and you live it."

Which sounded like something out of the Alice books.

"It's safe," said the cabinet. "It's perfectly safe. You can come back any time you wish."

"Thank you," Bishop said.

He went into the room and sat down in the chair and studied the buttons on the arms.

History?

Might as well, he told himself. He knew a bit of history. He'd been interested in it and taken several courses and did a lot of supplemental reading.

He punched the "History" button.

A panel in the wall before the chair lit up and a face appeared—the face of a Kimonian, the bronzed and golden face, the classic beauty of the race.

Aren't any of them homely, Bishop wondered. None of them ugly or crippled, like the rest of humanity?

"What type of history, sir?" the face in the screen asked him.

"Type?"

"Galactic, Kimonian, Earth—almost any place you wish."

"Earth, please," said Bishop.

"Specifications?"

"England," said Bishop. "October 14, 1066. A place called Senlac."

And he was there.

He was no longer in the room with its single chair and its four bare walls, but he stood upon a hill in sunny autumn weather with the gold and red of trees and the blueness of the haze and the shouts of men.

He stood rooted in the grass that blew upon the hillside and saw that the grass had turned to hay with its age and sunshine—and out beyond the grass and hill, grouped down on the plain, was a ragged line of horsemen, with the sun upon their helmets and flashing on their shields, with the leopard banners curling in the wind.

It was October 14th and it was Saturday and on the hill stood Harold's hosts behind their locked shield wall and before the sun had set new forces would have been put in motion to shape the course of empire.

Taillefer, he thought. Taillefer will ride in the fore of William's charge, singing the "*Chanson de Roland*" and wheeling his sword into the air so that it becomes a wheel of fire to lead the others on.

The Normans charged and there was no Taillefer. There was no one who wheeled his sword into the air, there was no singing. There was merely shouting and the hoarse crying of men riding to their death.

The horsemen were charging directly at him and he wheeled and tried

to run, but he could not outrun them and they were upon him. He saw the flash of polished hoofs and the cruel steel of the shoes upon the hoofs, the glinting lance point, the swaying, jouncing scabbard, the red and green and yellow of the cloaks, the dullness of the armor, the open roaring mouths of men—and they were upon him. And passing through him and over him as if he were not there.

He stopped stock-still, heart hammering in his chest, and, as if from somewhere far off, he felt the wind of the charging horses that were running all around him.

Up the hill there were hoarse cries of "Ut! Ut!" and the high, sharp ring of steel. Dust was rising all around him and somewhere off to the left a dying horse was screaming. Out of the dust a man came running down the hill. He staggered and fell and got up and ran again and Bishop could see that blood poured out of the ripped armor and washed down across the metal, spraying the dead, sere grass as he ran down the hill.

The horses came back again, some of them riderless, running with their necks outstretched, with the reins flying in the wind, with foam dashing from their mouths.

One man sagged in the saddle and fell off, but his foot caught in the stirrup and his horse, shying, dragged him sidewise.

Up on top the hill the Saxon square was cheering and through the settling dust he saw the heap of bodies that lay outside the shield wall.

Let me out of here! Bishop was screaming to himself. *How do I get out of here! Let me out* —

He was out, back in the room again, with its single chair and the four blank walls.

He sat there quietly and he thought:

There was no Taillefer.

No one who rode and sang and tossed the sword in air.

The tale of Taillefer was no more than the imagination of some copyist who had improved upon the tale to while away his time.

But men had died. They had run down the hill, staggering with their wounds, and died. They had fallen from their horses and been dragged to death by their frightened mounts. They had come crawling down the hill, with minutes left of life and with a whimper in their throats.

He stood up and his hands were shaking.

He walked unsteadily into the next room.

"You are going to bed, sir?" asked the cabinet.

"I think I will," said Bishop.

"Very good, then, sir. I'll lock up and put out."

"That's very good of you.

"Routine, sir," said the cabinet. "Is there anything you wish."

"Not a thing," said Bishop. "Good night."

"Good night," said the cabinet.

IX.

In the morning he went to the employment agency which he found in one corner of the hotel lobby.

There was no one around but a Kimonian girl, a tall, statuesque blonde, but with a grace to put to shame the most petite of humans. A woman, Bishop thought, jerked out of some classic Grecian myth, a blond goddess come to life and beauty. She didn't wear the flowing Grecian robe, but she could have. She wore, truth to tell, but little, and was all the better for it.

"You are new," she said.

He nodded.

"Wait, I know," she said. She looked at him: "Selden Bishop, age twenty-nine Earth years, I.Q., 160."

"Yes, ma'm," he said.

She made him feel as if he should bow and scrape.

"Business administration, I understand," she said.

He nodded, bleakly.

"Please sit down, Mr. Bishop, and we will talk this over."

He sat down and he was thinking: It isn't right for a beautiful girl to be so big and husky. Nor so competent.

"You'd like to get started doing something," said the girl.

"That's the thought I had."

"You specialized in business administration. I'm afraid there aren't many openings in that particular field."

"I wouldn't expect too much to start with," Bishop told her with what he felt was a becoming modesty and a realistic outlook. "Almost anything at all, until I can prove my value."

"You'd have to start at the very bottom. And it would take years of training. Not in method only, but in attitude and philosophy."

"I wouldn't — "

He hesitated. He had meant to say that he wouldn't mind. But he would mind. He would mind a lot.

"But I spent years," he said. "I know —"

"Kimonian business?"

"Is it so much different?"

"You know all about contracts, I suppose."

"Certainly I do."

"There is no such a thing as a contract on all of Kimon."

"But —"

"There is no need of any."

"Integrity?"

"That, and other things as well."

"Other things?"

"You wouldn't understand."

"Try me."

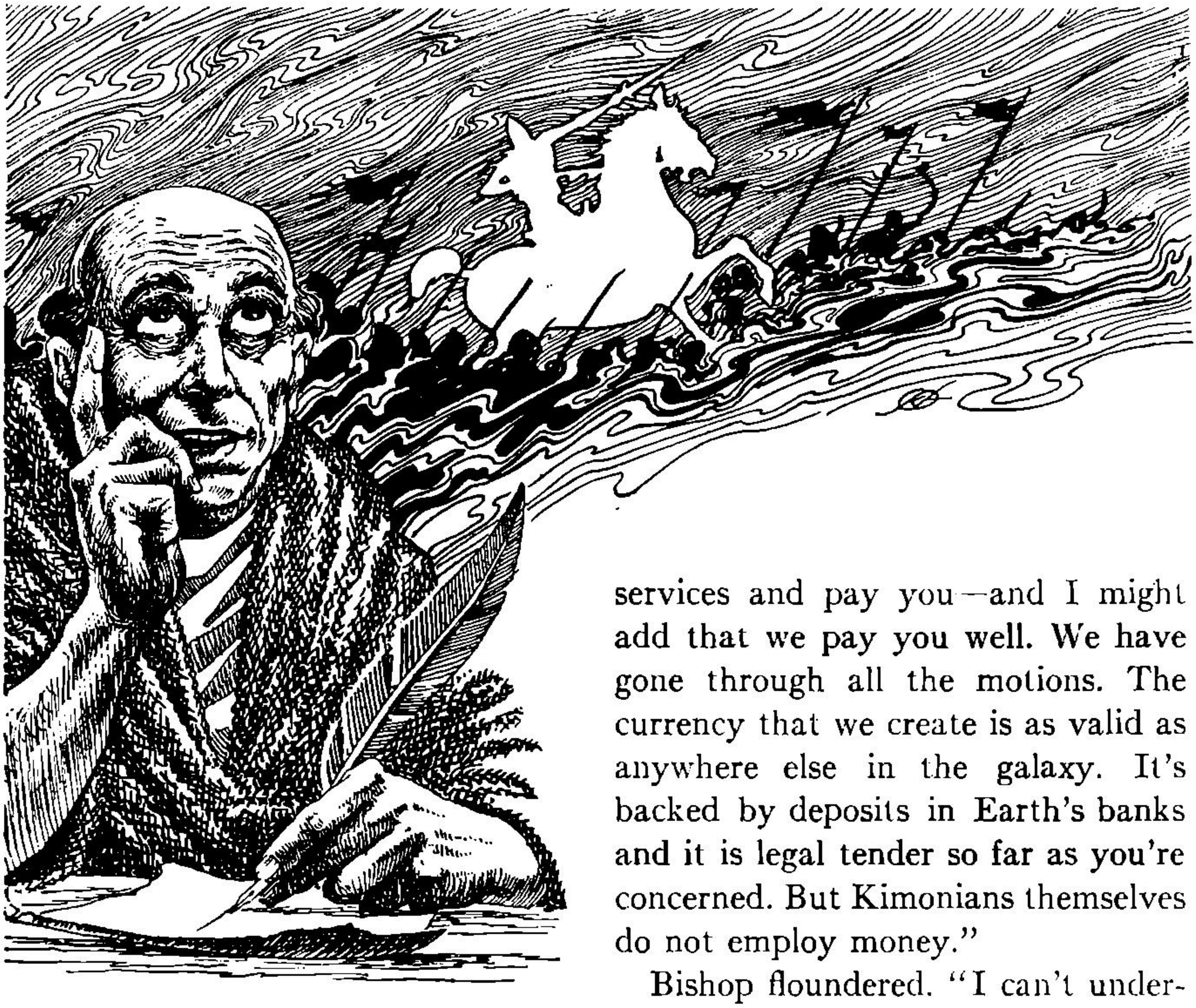
"It would be useless, Mr. Bishop. New concepts entirely so far as you're concerned. Of behavior. Of motives. On Earth, profit is the motive —"

"Isn't it here?"

"In part. A very small part."

"The other motives —"

"Cultural development for one.



Can you imagine an urge to cultural development as powerful as the profit motive?"

Bishop was honest about it. "No, I can't," he said.

"Here," she said, "it is the more powerful of the two. But that's not all. Money is another thing. We have no actual money. No coin that changes hands."

"But there is money. Credit notes."

"For the convenience of your race alone," she said. "We created your money values and your evidence of wealth so that we could hire your services and pay you—and I might add that we pay you well. We have gone through all the motions. The currency that we create is as valid as anywhere else in the galaxy. It's backed by deposits in Earth's banks and it is legal tender so far as you're concerned. But Kimonians themselves do not employ money."

Bishop floundered. "I can't understand," he said.

"Of course you can't," she said. "It's an entirely new departure for you. Your culture is so constituted that there must be a certain physical assurance of each person's wealth and worth. Here we do not need that physical assurance. Here each person carries in his head the simple bookkeeping of his worth and debts. It is there for him to know. It is there for his friends and business associates to see at any time they wish."

"It isn't business, then," said Bishop. "Not business as I think of it."

"Exactly," said the girl.

"But I am trained for business. I spent—"

"Years and years of study. But on Earth's methods of business, not on Kimon's."

"But there are business men here. Hundreds of them."

"Are there?" she asked.

And she was smiling at him. Not a superior smile, nor a taunting one—just smiling at him.

"What you need," she said, "is contact with Kimonians. A chance to get to know your way around. An opportunity to appreciate our point of view and get the hang of how we do things."

"That sounds all right," said Bishop. "How do I go about it?"

"There have been instances," said the girl, "when Earth people sold their services as companions."

"I don't think I'd care much for that. It sounds . . . well, like baby sitting or reading to old ladies or . . ."

"Can you play an instrument or sing?"

Bishop shook his head.

"Paint? Draw? Dance?"

He couldn't do any of them.

"Box, perhaps," she said. "Physical combat. That is popular at times, if it's not overdone."

"You mean prize fighting?"

"I think that is one way you describe it."

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

"That doesn't leave much," she said as she picked up some papers.

"Transportation?" he asked.

"Transportation is a personal matter."

And of course it was, he told himself. With telekinesis, you could transport yourself or anything you might have a mind to move—without mechanical aid.

"Communications," he said weakly. "I suppose that is the same?"

She nodded.

With telepathy, it would be.

"You know about transportation and communications, Mr. Bishop?"

"Earth variety," said Bishop. "No good here, I gather."

"None at all," she said. "Although we might arrange a lecture tour. Some of us would help you put your material together."

Bishop shook his head. "I can't talk," he said.

She got up.

"I'll check around," she said. "Drop in again. We'll find something that you'll fit."

"Thanks," he said and went back to the lobby.

X.

He went for a walk.

There were no roads or paths.

There was nothing.

The hotel stood on the plain and there was nothing else.

No buildings around it. No village. No roads. Nothing.

It stood there, huge and ornate and lonely, like a misplaced thing.

It stood stark against the skyline, for there were no other buildings to blend into it and soften it and it looked like something that someone in a hurry had dumped down and left.

He struck out across the plain toward some trees that he thought must mark a watercourse and he wondered why there were no paths or roads, but suddenly he knew why there were no paths or roads.

He thought about the years he had spent cramming business administration into his brain and he remembered the huge book of excerpts from the letters written home from Kimon hinting at big business deals, at responsible positions.

And the thought struck him that there was one thing in common in all of the excerpts in the book—that the deals and positions were always hinted at, that no one had ever told exactly what he did.

Why did they do it? he asked himself. Why did they fool us all?

Although, of course, there might be more to it than he knew. He had been on Kimon for somewhat less than a full day's time. I'll look around, the Grecian blonde had said—I'll look around, we'll find somewhere that you fit.

He went on across the plain and reached the line of trees and found the stream. It was a prairie stream, a broad, sluggish flow of crystal water between two grassy banks. Lying on his stomach to peer into the depths, he saw the flash of fishes far below him.

He took off his shoes and dangled his feet in the water and kicked a little to make the water splash, and he thought:

They know all about us. They know about our life and culture. They know about the leopard banners and how Senlac must have looked on Saturday, October 14, 1066, with the hosts of England massed upon the hilltop and the hosts of William on the plain below.

They know what makes us tick and they let us come and because they let us come, there must be some value in us.

What had the girl said, the girl who had floated to the stool and then had left with her drink still standing and untouched. Faint amusement, she had said. You get used to it, she had said. If you don't think too much about it, you get used to it.

See me in a week, she had said. In a week you and I can talk. And she had called him Buster.

Well, maybe she had a right to call him that. He had been starry-eyed and a sort of eager beaver. And probably ignorant-smug.

They know about us and how do they know about us?

Senlac might have been staged, but he didn't think so—there was a strange, grim reality about it that got

under your skin, a crawling sort of feeling that told you it was true, that that was how it had happened and had been. That there had been no Taillefer and that a man had died with his guts dragging in the grass and that the Englishmen had cried "Ut! Ut!" which might have meant almost anything at all or nothing just as well, but probably had meant "Out."

He sat there, cold and lonely, wondering how they did it. How they had made it possible for a man to punch a button and to live a scene long dead, to see the death of men who had long been dust mingled with the earth.

There was no way to know, of course.

There was no use to guess.

Technical information, Morley Reed had said, that would revolutionalize our entire economic pattern.

He remembered Morley pacing up and down the room and saying: "We must find out about them. We must find out."

And there was a way to find out.

There was a splendid way.

He took his feet out of the water and dried them with handfuls of grass. He put his shoes back on and walked back to the hotel sitting by itself.

The blond goddess still was at her desk in the Employment Bureau.

"About that baby sitting job," he said.

She looked startled for a moment—terribly, almost childishly startled, but her face slid swiftly back to its goddess-mask.

"Yes, Mr. Bishop."

"I've thought it over," he said. "If you have that kind of job I'll take it."

XI.

He lay in bed, sleepless, for a long time that night and took stock of himself and of the situation and he came to a decision that it might not be as bad as he thought it was.

There were jobs to be had, apparently. The Kimonians even seemed anxious that you should get a job. And even if it weren't the kind of work a man might want, or the kind that he was fitted for, it at least would be a start. From that first foothold a man could go up—a clever man, that is. And all the men and women, all the Earthians on Kimon, certainly were clever. If they weren't clever, they wouldn't be there to start with.

All of them seemed to be getting along. He had not seen either Monty or Maxine that evening, but he had talked to others and all of them seemed to be satisfied—or at least keeping up the appearance of being satisfied. If there were general dissatisfaction, Bishop told himself, there wouldn't even be the appearance of being satisfied, for there is nothing that an Earthian likes better than

some quiet and mutual griping. And he had heard none of it—none of it at all.

He had heard some more talk about the starting of the athletic teams and had talked to several men who had been enthusiastic about it as a source of revenue.

He had talked to another man named Thomas who was a gardening expert at one of the big Kimonian estates and the man had talked for an hour or more on the growing of exotic flowers. There had been a little man named Williams who had sat in the bar beside him and had told him enthusiastically of his commission to write a book of ballads based on Kimonian history and another man named Jackson who was executing a piece of statuary for one of the native families.

If a man could get a satisfactory job, Bishop thought, life could be pleasant here on Kimon.

Take the rooms he had. Beautiful appointments, much better than he could expect at home. A willing cabinet-robot who dished up drinks and sandwiches, who pressed clothes, turned out and locked up, and anticipated your no-more-than-half-formed wish. And the room—the room with the four blank walls and the single chair with the buttons on its arm. There, in that room, was instruction and entertainment and adventure. He had made a bad choice in picking the battle of Hastings for his first test of it, he knew now. But there were other places, other times, other more pleasant and less bloody incidents that one could experience.

It was experience, too—and not merely seeing. He had really been walking on the hilltop. He had tried to dodge the charging horses, although there'd been no reason to, for apparently, even in the midst of a happening, you stood by some special dispensation as a thing apart, as an interested but unreachable observer.

And there were, he told himself, many happenings that would be worth observing. One could live out the entire history of mankind, from the prehistoric dawnings to the day before yesterday—and not only the history of mankind, but the history of other things as well, for there had been other categories of experience offered—Kimonian and Galactic—in addition to Earth.

Some day, he thought, I will walk with Shakespeare. Some day I'll sail with Columbus. Or travel with Prester John and find the truth about him.

For it was truth. You could sense the truth.

And how the truth?

That he could not know.

But it all boiled down to the fact that while conditions might be strange, one still could make a life of it.

And conditions would be strange, for this was an alien land and one that was immeasurably in advance of Earth in culture and in its technology.

Here there was no need of artificial communications nor of mechanical transportation. Here there was no need of contracts since the mere fact of telepathy would reveal one man to another so there'd be no need of contracts.

You have to adapt, Bishop told himself.

You'd have to adapt and play the Kimon game, for they were the ones who would set the rules. Unbidden he had entered their planet and they had let him stay and staying, it followed that he must conform.

"You are restless, sir," said the cabinet from the other room.

"Not restless," Bishop said. "Just thinking."

"I can supply you with a sedative. A very mild and pleasant sedative."

"Not a sedative," said Bishop.

"Then, perhaps," the cabinet said, "you would permit me to sing you a lullaby."

"By all means," said Bishop. "A lullaby is just the thing I need."

So the cabinet sang him a lullaby and after a time Bishop went to sleep.

XII.

The Kimonian goddess at the employment bureau told him next morning that there was a job for him.

"A new family," she said.

Bishop wondered if he should be glad that it was a new family or if it would have been better if it had been an old one.

"They've never had a human before," she said.

"It's fine of them," said Bishop, "to finally take one in."

"The salary," said the goddess, "is one hundred credits a day."

"One hundred—"

"You will only work during days," she said. "I'll teleport you there each morning and in the evening they'll teleport you back."

Bishop gulped. "One hundred—What am I to do?"

"A companion," said the goddess. "But you needn't worry. We'll keep an eye on them and if they mistreat you—"

"Mistreat me?"

"Work you too hard or—"

"Miss," said Bishop, "for a hundred bucks a day I'd—"

She cut him short. "You will take the job?"

"Most gladly," Bishop said.

"Permit me—"

The universe came unstuck, then slapped back together.

He was standing in an alcove and in front of him was a woodland glen with a waterfall and from where he stood he could smell the cool, mossy freshness of the tumbling water. There were ferns and trees, huge trees like the gnarled oaks the illustrators like to draw to illustrate King Arthur and Robin Hood and other tales of very early Britain—

the kind of oaks from which the Druids had cut the mistletoe.

A path ran along the stream and up the incline down which the waterfall came tumbling and there was a blowing wind that carried music and perfume.

A girl came down the path and she was Kimonian, but she didn't seem as tall as the others he had seen and there was something a little less goddesslike about her.

He caught his breath and watched her and for a moment he forgot that she was Kimonian and thought of her only as a pretty girl who walked a woodland path. She was beautiful, he told himself—she was lovely.

She saw him and clapped her hands.

"You must be he," she said

He stepped out of the cubicle.

"We have been waiting for you," she told him. "We hoped there'd be no delay, that they'd send you right along."

"My name," said Bishop, "is Selden Bishop and I was told—"

"Of course you are the one," she said. "You needn't even tell me. It's lying in your mind."

She waved an arm about her.

"How do you like our house?" she asked.

"House?"

"Of course, silly. This. Naturally it's only the living room. Our bedrooms are up in the mountains. But we changed this just yesterday. Everyone worked so hard at it. I do hope you like it. Because, you see, it is from your planet. We thought it might make you feel at home."

"House," he said again.

She reached out a hand and laid it on his arm.

"You're all upset," she said. "You don't begin to understand."

Bishop shook his head. "I just arrived the other day."

"But do you like it?"

"Of course I do," said Bishop. "It's something out of the old Arthurian legend. You'd expect to see Lancelot or Guinevere or some of the others riding through the woods."

"You know the stories?"

"Of course I know the stories. I read my Tennyson."

"And you will tell them to us."

He looked at her, a little startled.

"You mean you want to hear them."

"Why, yes, of course we do. What did we get you for?"

And that was it, of course.

What had they got him for?

"You want me to begin right now?"

"Not now," she said. "There are the others you must meet. My name is Elaine. That's not exactly it, of course. It is something else, but Elaine is as close as you'll ever come to saying it."

"I could try the other name. I'm proficient at the languages."

"Elaine is good enough," she said carelessly. "Come along."

He fell in behind her on the path and followed up the incline.

And as he walked along, he saw that it was indeed a house—that the trees were pillars holding up an artificial sky that somehow failed to look very artificial and that the aisles between the trees ended in great windows which looked out on the barren plain.

But the grass and flowers, the moss and ferns, were real and he had a feeling that the trees must be real as well.

"It doesn't matter if they're real or not," said Elaine. "You couldn't tell the difference."

They came to the top of the incline into a parklike place, where the grass was cut so closely and looked so velvety that he wondered for a moment if it were really grass.

"It is," Elaine told him.

"You catch everything I think," he said. "Isn't—"

"Everything," said Elaine.

"Then I mustn't think."

"Oh, but we want you to," she told him. "That is part of it."

"Part of what you got me for?"

"Exactly," said the girl.

In the middle of the parklike area was a sort of pagoda, a flimsy thing that seemed to be made out of light and shadow rather than anything with substance, and around it were a half a dozen people.

They were laughing and chatting and the sound of them was like the sound of music—very happy, but at the same time, sophisticated music.

"There they are," cried Elaine.

"Come along," she said.

She ran and her running was like flying and his breath caught in his throat at the slimness and the grace of her.

He ran after her and there was no grace in his running. He could feel the heaviness of it. It was a gambol rather than a run, an awkward lope in comparison to the running of Elaine.

Like a dog, he thought. Like an overgrown puppy trying to keep up, falling over its own feet, with its tongue hanging out and panting.

He tried to run more gracefully and he tried to erase the thinking from his mind.

Mustn't think. Mustn't think at all. They catch everything. They will laugh at you.

They *were* laughing at him.

He could feel their laughter, the silent, gracious amusement that was racing in their minds.

She reached the group and waited.

"Hurry up," she called and while her words were kindly, he could feel the amusement in the words.

He hurried. He pounded down upon them. He arrived, somewhat out of breath. He felt winded and sweaty and extremely uncouth.

"This is the one they sent us," said Elaine. "His name is Bishop. Is that not a lovely name?"

They watched him, nodding gravely.

"He will tell us stories," said Elaine. "He knows the stories that go with a place like this."

They were looking kindly at him, but he could sense the covert amusement, growing by the moment.

She said to Bishop: "This is Paul. And that one over there is Jim. Betty. Jane, George. And the one on the end is Mary."

"You understand," said Jim, "those are not our names."

"They are approximations," said Elaine. "The best that I could do."

"They are as close," said Jane, "as he can pronounce them."

"If you'd only give me a chance," said Bishop, then stopped short.

That was what they wanted. They wanted him to protest and squirm. They wanted him to be uncomfortable.

"But of course we don't," said Elaine.

Mustn't think. Must try to keep from thinking. They catch everything.

"Let's all sit down," said Betty. "Bishop will tell us stories."

"Perhaps," Jim said to him, "you will describe your life on Earth. I would be quite interested."

"I understand you have a game called chess," said George. "We can't play games, of course. You know why we can't. But I'd be very interested in discussing with you the technique and philosophy of chess."

"One at a time," said Elaine. "First he will tell us stories."

They sat down on the grass, in a ragged circle.

All of them were looking at him, waiting for him to start.

"I don't quite know where to start," he said.

"Why, that's obvious," said Betty. "You start at the beginning."

"Quite right," said Bishop.

He took a deep breath.

"Once, long ago, in the island of Britain, there was a great king whose name was Arthur—"

"Ycelpt," said Jim.

"You've read the stories?"

"The word was in your mind."

"It's an old word, an archaic word. In some versions of the tales—"

"I would be most interested sometime to discuss the word with you," said Jim.

"Go on with your story," said Elaine.

He took another deep breath.

"Once, long ago, in the island of Britain, there was a great king whose name was Arthur. His queen was Guinevere and Lancelot was his staunchest knight—"

XIII.

He found the writer in the desk in the living room and pulled it out. He sat down to write a letter.

He typed the salutation:

Dear Morley:

He got up and began pacing up

and down the room.

What would he tell him?

What could he tell him?

That he had safely arrived and that he had a job?

That the job paid a hundred credits a day—ten times more than a man in his position could earn at any Earth job?

He went back to the writer again.

He wrote:

Just a note to let you know that I arrived here safely and already have a job. Not too good a job perhaps, but it pays a hundred a day and that's better than I could have done on Earth.

He got up and walked again.

There had to be more than that. More than just a paragraph.

He sweated as he walked.

What could he tell him.

He went back to the writer again:

In order to learn the conditions and the customs more quickly I have taken a job which will keep me in touch with the Kimonians. I find them to be a fine people, but sometimes a little hard to understand. I have no doubt that before too long I shall get to understand them and have a genuine liking for them.

He pushed back his chair and stared at what he'd written.

It was, he told himself, like any one of a thousand other letters he had read.

He pictured in his mind those other thousand people, sitting down to write their first letter from Kimon, searching in their mind for the polite little fables, for the slightly colored lie, for the balm that would salve their pride. Hunting for the words that would not reveal the entire truth:

I have a job of entertaining and amusing a certain family. I tell them stories and let them laugh at me. I do this because I will not admit that the fable of Kimon is a booby trap and that I've fallen into it—

No, it would never do to write like that.

Nor to write:

I'm sticking on in spite of them. So long as I make a hundred a day, they can laugh as much as they want to laugh. I'm staying here and cleaning up no matter what—

Back home he was one of the thousand. Back home they talked of him in whispers because he made the grade.

And the businessmen on board the ship, saying to him: "The one who cracks this Kimon business is the one who'll have it big," and talking in terms of billions if he ever needed backing.

He remembered Morley pacing up and down the room. A foot in the door, he'd said: "Some way to crack them. Some way to understand them. Some little thing—no big thing, but some little thing. Anything at all except the deadpan face that Kimon turns toward us."

Somehow he had to finish the letter. He couldn't leave it hanging and he had to write it.

He turned back to the writer:

I'll write you later at a greater length. At the moment I'm rushed.

He frowned at it.

But whatever he wrote, it would be wrong. This was no worse than any of another dozen things that he might write.

Must rush off to a conference.

Have an appointment with a client.

Some papers to go through.

All of them were wrong.

What was a man to do?

He wrote:

Think of you often. Write me when you can.

Morley would write him. An enthusiastic letter, a letter with a fine shade of envy tingeing it, the letter of a man who wanted to be, but couldn't be on Kimon.

For everyone wanted to go to Kimon. That was the hell of it.

You couldn't tell the truth, when everyone would give their good right arm to go.

You couldn't tell the truth when you were a hero and the truth would turn you into a galactic heel.

And the letters from home, the prideful letters, the envious letters, the letters happy with the thought you were doing so well — all of these would be only further chains to bind you to Kimon and to the Kimon lie.

He said to the cabinet. "How about a drink?"

"Yes, sir," said the cabinet. "Coming right up, sir."

"A long one," Bishop said, "and a strong one."

"Long and strong it is, sir."

XIV.

He met her in the bar.

"Why, if it isn't Buster!" she

said, as though they met there often.

He sat on the stool beside her.

"That week is almost up," he said.

She nodded. "We've been watching you. You're standing up real well."

"You tried to tell me."

"Forget it," said the girl. "Just a mistake of mine. It's a waste of time telling any of them. But you looked intelligent and not quite dry behind the ears. I took pity on you."

She looked at him over the rim of her glass.

"I shouldn't have," she said.

"I should have listened."

"They never do," said Maxine.

"There's another thing," he said. "Why hasn't it leaked out? Oh, sure, I have written letters, too. I didn't admit what it was like. Neither did you. Nor the man next to you. But someone, in all the years we've been here—"

"We are all alike," she said. "Alike as peas in the pod. We are the anointed, the hand-picked, stubborn, vanity-stricken, scared. All of us got here. In spite of hell and high water we got here. We let nothing stand in our way and we made it. We beat the others out. They're waiting back there on Earth—the ones that we beat out. They'll never be quite the same again. Don't you understand it. They had pride, too, and it was hurt. There's nothing they would like better than to know what it's really like. That's what all of us think of when we sit down to write a letter. We think of the belly laughs by those other thousands. The quiet smirks. We think of ourselves skulking, making ourselves small so no one will notice us—"

She balled a fist and rapped against his shirt front.

"That's the answer, Buster. That's why we never write the truth. That's why we don't go back."

"But it's been going on for years. For almost a hundred years. In all that time someone should have cracked—"

"And lost all this?" she asked. "Lost the easy living. The good drinking. The fellowship of lost souls. And the hope. Don't forget that. Always the hope that Kimon can be cracked."

"Can it?"

"I don't know. But if I were you, Buster, I wouldn't count on it."

"But it's no kind of a life for decent—"

"Don't say it. We aren't decent people. We are scared and weak, every one of us. And with good reason."

"But the life—"

"You don't lead a decent life, if that was what you were about to say. There's no stability in us. Children? A few of us have children and it's not so bad for the children as it is for us, because they know nothing else. A child who is born a slave is better off, mentally, than a man who once knew freedom."

"We aren't slaves," said Bishop.

"Of course not," Maxine said. "We can leave any time we want to. All

we got to do is walk up to a native and say 'I want to go back to Earth.' That's all you need to do. Any single one of them could send you back—*swish*—just like they send the letters, just like they whisk you to your work or to your room."

"But no one has gone back."

"Of course no one has," she said.

They sat there, sipping at their drinks.

"Remember what I told you," she said. "Don't think. That's the way to beat it. Never think about it. You got it good. You never had it so good. Soft living. Easy living. Nothing to worry about. The best kind of life there is."

"Sure," said Bishop. "Sure that's the way to do it."

She slanted her eyes at him.

"You're catching on," she said.

They had another round.

Over in the corner a group had gotten together and was doing some impromptu singing. A couple were quarreling a stool or two away.

"It's too noisy in this place," Maxine said. "Want to see my paintings?"

"Your paintings?"

"The way I make my living. They are pretty bad, but no one knows the difference."

"I'd like to see them."

"Grab hold then."

"Grab—"

"My mind, you know. Nothing physical about it. No use riding elevators."

He gaped at her.

"You pick it up," said Maxine. "You never get too good. But you pick up a trick or two."

"But how do I go about it?"

"Just let loose," she said. "Dangle. Mentally, that is. Try to reach out to me. Don't try to help. You can't."

He dangled and reached out, wondering if he was doing it the way it should be done.

The universe collapsed and then came back together.

They were standing in another room.

"That was a silly thing for me to do," Maxine said. "Some day I'll slip a cog and get stuck in a wall or something."

Bishop drew a deep breath.

"Monty could read me just a little," he said. "Said you picked it up—just at the fringes."

"You never get too good," said Maxine. "Humans aren't . . . well, aren't ripe for it, I guess. It takes millennia to develop it."

He looked around him and whistled.

"Quite a place," he said.

It was all of that.

It didn't seem to be a room at all, although it had furniture. The walls were hazed in distance and to the west were mountains, peaked with snow, and to the east a very sylvan river and there were flowers and flowering bushes everywhere, growing from the floor. A deep blue dusk filled

the room and somewhere off in the distance there was an orchestra.

A cabinet-voice said. "Anything, madam?"

"Drinks," said Maxine. "Not too strong. We've been hitting the bottle."

"Not too strong," said the cabinet. "Just a moment, madam."

"Illusion," Maxine said. "Every bit of it. But a nice illusion. Want a beach. It's waiting for you if you just think of it. Or a polar cap. Or a desert. Or an old chateau. It's waiting in the wings."

"Your painting must pay off," he said.

"Not my painting. My irritation. Better start getting irritated, Buster. Get down in the dumps. Start thinking about suicide. That's a sure-fire way to do it. Presto, you're kicked upstairs to a better suite of rooms. Anything to keep you happy."

"You mean the Kimonians automatically shift you?"

"Sure. You're a sucker to stay down there where you are."

"I like my layout," he told her. "But this—"

She laughed at him. "You'll catch on," she said.

The drinks arrived.

"Sit down," Maxine said. "Want a moon?"

There was a moon.

"Could have two or three," she said, "but that would be overdoing it. One moon seems more like Earth. Seems more comfortable."

"There must be a limit somewhere," Bishop said. "They can't keep on kicking you upstairs indefinitely. There must come a time when even the Kimonians can't come up with anything that is new and novel."

"You wouldn't live long enough," she told him, "for that to come about. That's the way with all you new ones. You underestimate the Kimonians. You think of them as people, as Earth people who know just a little more. They aren't that, at all. They're alien. They're as alien as a spider-man despite their human form. They conform to keep contact with us."

"But why do they want to keep contact with us? Why—"

"Buster," she said, "that's the question that we never ask. That's the one that can drive you crazy."

XV.

He had told them about the human custom of going out on picnics and the idea was one that they had never thought of, so they adopted it with childish delight.

They had picked a wild place, a tumbled mountain area, filled with deep ravines, clothed in flowers and trees and with a mountain brook with water that was as clear as glass and as cold as ice.

They had played games and romped. They had swam and sunbathed and they had listened to his stories, sitting in a circle, needling him and inter-

rupting him, picking arguments.

But he had laughed at them, not openly, but deep inside himself, for he knew now that they meant no harm, but merely sought amusement.

Weeks before he had been insulted and outraged and humiliated, but as the days went on he had adapted to it —had forced himself to adapt. If they wished a clown, then he would be a clown. If he were court fool, with bells and parti-colored garments, then he must wear the colors well and keep the bells ringing merrily.

There was occasional maliciousness in them and some cruelty, but no lasting harm. And you could get along with them, he told himself, if you just knew how to do it.

When evening came they had built a fire and had sat around it and had talked and laughed and joked, for once leaving him alone. Elaine and Betty had been nervous. Jim had laughed at them for their nervousness.

"No animal will come near a fire," he said.

"There are animals?" Bishop had asked.

"A few," said Jim. "Not many of them left."

He had lain there, staring at the fire, listening to their voices, glad that for once they were leaving him alone. Like a dog must feel, he thought. Like a pup hiding in a corner from a gang of rowdy children who are always mauling it.

He watched the fire and remembered other days—outings in the country and walking trips when they had built a fire and lay around it, staring at the sky, seeing the old, familiar skies of Earth.

And here again was another fire.

And here, again, a picnic.

The fire was Earth and so was the picnic—for the people of Kimon did not know of picnics. They did not know of picnics and there might be many other things of which they likewise did not know. Many other things, perhaps. Barbaric, folkish things.

Don't look for the big things, Morley had said that night. Watch for the little things, for the little clues.

They liked Maxine's paintings because they were primitives. Primitives, perhaps, but likewise not very good. Could it be that paintings also had been something the Kimonians had not known until the Earthmen came?

Were there, after all, chinks in the Kimonian armor. Little chinks like picnics and paintings and many other little things for which they valued the visitors from Earth?

Somewhere in those chinks might be the answer that he sought for Morley.

He lay and thought, forgetting to shield his mind, forgetting that he should not think because his thoughts lay open to them.

Their voices had faded away and there was a solemn night-time quiet. Soon, he thought, we'll all be going back—they to their homes and I to the hotel. How far away, he wondered.

Half a world or less? And yet they'd be there in the instant of a thought.

Someone, he thought, should put more wood on the fire.

He roused himself to do it, standing up.

And it was not until then that he saw he was alone.

He stood there, trying to quiet his terror.

They had gone away and left him.

They had forgotten him.

But that couldn't be. They'd simply slipped off in the dark. Up to some prank, perhaps. Trying to scare him. Talking about the animals and then slipping out of sight while he lay dreaming at the fire. Waiting now, just outside the circle of the firelight, watching him, drinking in his thoughts, reveling in his terror.

He found wood and put it on the fire. It caught and blazed.

He sat down nonchalantly, but he found that his shoulders were hunched instinctively, that the terror of aloneness in an alien world still sat by the fire beside him.

Now, for the first time, he realized the alienness of Kimon. It had not seemed alien before except for those few minutes he had waited in the park after the gig had landed him, and even then it had not been as alien as an alien planet should be because he knew that he was being met, that there would be someone along to take care of him.

That was it, he thought. Someone to take care of me. We're taken care of—well and lavishly. We're sheltered and guarded and pampered—that was it, *pampered*. And for what reason?

Any minute now they'd tire of their game and come back into the circle of the firelight.

Maybe, he told himself, I should give them their money's worth. Maybe I should act scared, maybe I should shout out for them to come and get me, maybe I should glance around, out into the darkness, as if I were afraid of those animals that they talked about. They hadn't talked too much, of course. They were too clever for that, far too clever. Just a passing remark about existent animals, then on to something else. Not stressing it, not laying it on too thick. Not overdoing it. Just planting a suggestion that there were animals one could be afraid of.

He sat and waited, not as scared as he had been before, having rationalized away the fear that he first had felt. Like an Earth campfire, he thought. Except it isn't Earth. Except it's an alien planet.

There was a rustle in the bushes.

They'll be coming now, he thought. They've figured out that it didn't work. They'll be coming back.

The bushes rustled again and there was the sound of a dislodged stone.

He did not stir.

They can't scare me, he thought.

They can't scare—

He felt the breath upon his neck and leaped into the air, spinning as he leaped, stumbling as he came down, almost falling in the fire, then on his feet and scurrying to put the fire between him and the thing that had breathed upon his neck.

He crouched across the fire from it and saw the teeth in the gaping jaws. It raised its head and slashed, as if in pantomime and he could hear the clicking of the teeth as they came together and the little moaning rumble that came from the massive throat.

A wild thought came to him: It's not an animal at all. This is just part of the gag. Something they dreamed up. If they can build a house like an English wood, use it for a day or two, then cause it to disappear as something for which they have no further use, surely it would be a second's work to dream up an animal.

The animal padded forward and he thought: Animals should be afraid of fire. All animals are afraid of fire. It won't get me if I stay near the fire.

He stooped and grabbed a brand.

Animals are afraid of fire.

But this one wasn't.

It padded round the fire. It stretched out its neck and sniffed.

It wasn't in any hurry, for it was sure of him.

Sweat broke out on him and ran down his sides.

The animal came with a smooth rush, whipping around the fire.

He leaped, clearing the fire, to gain the other side of it.

The animal checked itself, spun around to face him.

It put its muzzle to the ground and arched its back. It lashed its tail. It rumbled.

He was frightened now, cold with a fright that could not be laughed off.

It might be an animal.

It must be an animal.

No gag at all, but an animal.

He paced back toward the fire. He danced on his toes, ready to run, to dodge, to fight if he had to fight. But against this thing that faced him across the fire, he knew, there was no fighting chance. And yet, if it came to fighting, he could do no less than fight.

The animal charged.

He ran.

He slipped and fell and rolled into the fire.

A hand reached down and jerked him from the fire, flung him to one side, and a voice cried out, a cry of rage and warning.

Then the universe collapsed and he felt himself flying apart and, as suddenly, he was together once again.

He lay upon a floor and he scrambled to his feet. His hand was burned and he felt the pain of it. His clothes were smoldering and he beat them out with his uninjured hand.

A voice said, "I'm sorry, sir. This should not have happened."

The man was tall, much taller than the Kimonians he had seen before.

Nine feet, perhaps. And yet not nine feet, actually. Not anywhere near nine feet. He was no taller, probably, than the taller men of Earth. It was the way he stood that made him seem so tall, the way he stood and looked and the way his voice sounded.

And the first Kimonian, Bishop thought, who had ever shown age. For there was a silvering of the temple hairs and his face was lined, like the faces of hunters or of sailors may be lined from squinting into far distances.

They stood facing one another in a room which, when Bishop looked at it, took his breath away. There was no describing it, no way to describe it—you felt as well as saw it. It was a part of you and a part of the universe and a part of everything you'd ever known or dreamed. It seemed to thrust extensions out into unguessed time and space and it had a sense of life and the touch of comfort and the feel of home.

Yet, when he looked again, he sensed a simplicity that did not square with his first impressions. Basic simplicities that tied in with the simple business of living out one's life, as if the room and the folks who lived within its walls were somehow integrated, as if the room were trying its best not to be a room, but to be a part of life, so much a part of life that it could pass unnoticed.

"I was against it from the first," said the Kimonian. "Now I know that I was right. But the children wanted you—"

"The children?"

"Certainly. I am Elaine's father."

He didn't say Elaine, however. He said the other name—the name that Elaine had said no Earthman could pronounce.

"Your hand?" asked the man.

"It's all right," said Bishop. "Only burned a little."

And it was as if he had not spoken, as if he had not said the words—but another man, a man who stood off to one side and spoke the words for him.

He could not have moved if he'd been paid a million.

"This is something," said the Kimonian. "that must be recompensed. We'll talk about it later."

"Please, sir," said the man who talked for Bishop. "Please, sir, just one thing. Send me to my hotel."

He felt the swiftness of the other's understanding—the compassion and the pity.

"Of course," said the tall man. "With your permission, sir."

XVI.

Once there were some children (human children, naturally) who had wanted a dog—a little playful puppy. But their father said they could not have a dog because they would not know how to treat him. But they wanted him so badly and begged their father so that he finally brought them home a dog, a cunning little puppy, a little butterball, with a paunchy belly

and four wobbly legs and melting eyes, filled with the innocence of puppyhood.

The children did not treat him as badly as you might have imagined that they would. They were cruel, as all children are. They roughed and tumbled him; they pulled his ears and tail; they teased him. But the pup was full of fun. He liked to play and no matter what they did he came back for more. Because, undoubtedly, he felt very smug in this business of associating with the clever human race, a race so far ahead of dogs in culture and intelligence that there was no comparison at all.

But one day the children went on a picnic and when the day was over they were very tired, and forgetful, as children are very apt to be. So they went off and left the puppy.

That wasn't a bad thing, really. For children will be forgetful, no matter what you do, and the pup was nothing but a dog.

The cabinet said: "You are very late, sir."

"Yes," said Bishop, dully.

"You hurt somewhere, sir. I can sense the hurt."

"My hand," said Bishop. "I burned it in a fire."

A panel popped open in the cabinet.

"Put it in there," said the cabinet. "I'll fix it in a jiffy."

Bishop thrust his hand into the opening. He felt fingerlike appendages going over it, very gently and soothing.

"It's not a bad burn, sir," said the cabinet, "but I imagine it is painful."

Playthings, Bishop thought.

This hotel is a dollhouse—or a doghouse.

It is a shack, a tacked-together shack like the boys of Earth build out of packing cases and bits of board and paint crude, mystic signs upon.

Compared to that room back there it is no more than a hovel, although, come to think of it, a very gaudy hovel.

Fit for humans, good enough for humans, but a hovel just the same.

And we? he thought.

And we?

The pets of children. The puppy dogs of Kimon.

Imported puppy dogs.

"I beg your pardon, sir," said the cabinet. "You are not puppy dogs."

"What's that?"

"You will pardon me, sir. I should not have spoken out. But I wouldn't have wanted you to think—"

"If we aren't pets, what are we?"

"You will excuse me, sir. It was a slip, I quite assure you. I should not have—"

"You never do a thing," said Bishop bitterly, "without having it all figured out. You or any of them. For you are one of them. You spoke because they wanted you to speak."

"I can assure you that's not so."

"You would deny it, naturally," said Bishop. "Go ahead and do your job. You haven't told me all they

wanted you to tell me. Go ahead and finish."

"It's immaterial to me what you think," the cabinet told him. "But if you thought of yourselves as playmates . . ."

"That's a hot one," Bishop said.

"Infinitely better," said the cabinet, "than thinking of yourself as a puppy dog."

"So that's what they want me to think."

"They don't care," the cabinet said. "It all is up to you. It was a mere suggestion, sir."

So, all right, it was a mere suggestion.

So, all right, they were playmates and not pets at all.

The kids of Kimon inviting the dirty, ragged, runny-nosed urchins from across the tracks to play with them.

Better to be an invited kid, perhaps, than an imported dog.

But even so, it was the children of Kimon who had engineered it all—who had set up the rules for those who wished to come to Kimon, who had built the hotel, had operated it and furnished it with the progressively more luxurious and more enticing rooms, who had found the so-called jobs for humans, who had arranged the printing of the credits.

And if that were so, then it meant that not merely the people of Earth, but the government of Earth, had negotiated, or had attempted to negotiate with the children of another race. And that would be the mark of the difference, he thought, the difference between us.

Although, he told himself, that might not be entirely right.

Maybe he *had* been wrong in thinking, in the first flush of his bitterness, that he was a pet.

Maybe he *was* a playmate, an adult Earthman downgraded to the status of a child—and a stupid child, at that.

Maybe, if he had been wrong on the pet angle, he was wrong in the belief, as well, that it had been the children of Kimon who had arranged the immigration of the Earth folk.

And if it hadn't been simply a childish matter of asking in some kids from across the tracks, if the adults of Kimon had had a hand in it, what was the set-up then? A school project, a certain phase of progressive education? Or a sort of summer camp project, designed to give the deserving, but underprivileged, Earthman a vacation away from the squalor of their native planet? Or simply a safe way in which the children of Kimon might amuse and occupy themselves, be kept from underfoot?

We should have guessed it long ago, Bishop told himself. But even if some of us might have entertained the thought, that we were either pet or playmate, we would have pushed it far away from us, would have refused to recognize it, for our pride is too tender and too raw for a thought like that.

"There you are, sir," said the cabinet. "Almost as good as new. Tomorrow you can take the dressing off."

He stood before the cabinet without answering. He withdrew his hand and let it fall to his side, like so much dead weight.

Without asking if he wanted it, the cabinet produced a drink.

"I made it long and strong," said the cabinet. "I thought you needed it."

"Thank you," Bishop said.

He took the drink and stood there with it, not touching it, not wanting to touch it until he'd finished out the thought.

And the thought would not finish out.

There was something wrong. Something that didn't track.

Our pride is too raw and tender—

There was something there, some extra words that badly needed saying.

"There is something wrong, sir."

"Nothing wrong," said Bishop.

"But your drink."

"I'll get around to it."

The Normans had sat their horses on that Saturday afternoon, with the leopard banners curling in the breeze, with the pennons on their lances fluttering, with the sun upon their armor and the scabbards clinking as the horses pranced. They had charged, as history said they had, and they were beaten back. That was entirely right, for it had not been until late afternoon that the Saxon wall was broken and the final fight around the dragon standard had not taken place until it was nearly dark.

But there had been no Taillefer, riding in the fore to throw up his sword and sing.

On that history had been wrong.

A couple of centuries later, more than likely, some copyist, had whiled away a monotonous afternoon by writing into the prosaic story of the battle the romance and the glitter of the charge of Taillefer. Writing it in protest against the four blank walls, against his Spartan food, against the daily dullness when spring was in the air and a man should be in the fields or woods instead of shut indoors, hunched with his quills and inkpots.

And that is the way it is with us, thought Bishop. We write the half-truth and the half-lie in our letters home. We conceal a truth or we obscure a fact or we add a line or two that, if not a downright lie, is certainly misleading.

We do not face up to facts he thought. We gloss over the man crawling in the grass, with his torn-out guts snagging on the brambles. We write in the Taillefer.

And if we only did it in our letters, it would not be so bad. But we do it to ourselves. We protect our pride by lying to ourselves. We shield our dignity by deliberate indignation.

"Here," he said to the cabinet, "have a drink on me."

He set the glass, still full, on the

top of the cabinet.

The cabinet gurgled in surprise.

"I do not drink," it said.

"Then take it back and put it in the bottle."

"I can't do that," said the cabinet, horrified. "It's already mixed."

"Separate it, then."

"It can't be separated," wailed the cabinet. "You surely don't expect me—"

There was a little swish and Maxine stood in the center of the room.

She smiled at Bishop.

"What goes on?" she asked.

The cabinet wailed at her. "He wants me to unmix a drink. He wants me to separate it, the liquor from the mix. He knows I can't do that."

"My, my," she said, "I thought you could do anything."

"I can't unravel a drink," the cabinet said primly. "Why don't you take it off my hands?"

"That's a good idea," said the girl. She walked forward and picked up the drink.

"What's wrong with you?" she asked Bishop. "Turning chicken on us?"

"I just don't want a drink," said Bishop. "Hasn't a man got a right to—"

"Of course," she said. "Of course you have."

She sipped the drink, looking at him above the rim.

"What happened to your hand?"

"Burned it."

"You're old enough not to play with fire."

"You're old enough not to come barging into a room this way," Bishop told her. "One of these days you'll reassemble yourself in the precise spot where someone else is standing."

She giggled. "That would be fun," she said. "Think of you and I—"

"It would be a mess," said Bishop.

"Invite me to sit down," said Maxine. "Let's act civilized and social."

"Sure, sit down," said Bishop.

She picked out a couch.

"I'm interested in this business of teleporting yourself," said Bishop. "I've asked you before, but you never told me—"

"It just came to me," she said.

"But you can't teleport. Humans aren't parapsychic—"

"Some day, Buster, you'll blow a fuse. You get so steamed up."

He went across the room and sat down beside her.

"Sure, I get steamed up," he said. "But—"

"What now?"

"Have you ever thought . . . well, have you ever tried to work at it? Like moving something else, some object—other than yourself?"

"No, I never have."

"Why not?"

"Look, Buster. I drop in to have a drink with you and to forget myself. I didn't come primed for a long technical discussion. I couldn't anyway. I just don't understand. There's so much we don't understand."

She looked at him and there was something very much like fright brimming in her eyes.

"You pretend that you don't mind," she said. "But you do mind. You wear yourself out pretending that you don't mind at all."

"Then let's quit pretending," Bishop said. "Let's admit—"

She had lifted the glass to drink and now, suddenly, it slipped out of her hand.

"Oh—"

The glass halted before it struck the floor. It hovered for a moment, then it slowly rose. She reached out and grasped it.

And then it slipped again from her suddenly shaking hand. This time it hit the floor and spilled.

"Try it again," said Bishop.

She said: "I never tried. I don't know how it happened. I just didn't want to drop it, that was all. I wished I hadn't dropped it and then—"

"But the second time—"

"You fool," she screamed, "I tell you I didn't try. I wasn't putting on an exhibition for you. I tell you that I don't know what happened."

"But you did it. It was a start."

"A start?"

"You caught the glass before it hit the floor. You teleported it back into your hand."

"Look, Buster," she said grimly, "quit kidding yourself. They're watch-

ing all the time. They play little tricks like that. Anything for a laugh."

She rose, laughing at him, but there was a strangeness in her laughing.

"You don't give yourself a chance," he told her. "You are so horribly afraid of being laughed at. You got to be a wise guy."

"Thanks for the drink," she said.

"But Maxine—"

"Come up and see me sometime."

"Maxine! Wait!"

But she was gone.

XVII.

Watch for the clues, Morley had said, pacing up and down the room. Send us back the clues and we will do the rest. A foot in the door is all we expect from you. Give us a foot inside the door and that is all we need.

Clues, he had said.

Not facts, but clues.

And perhaps he had said clues instead of facts because he had been blinded like all the rest of them. Like the copyist who could not face up to the fact of battle without chivalry. Like those who wrote the letters home from Kimon. Like Maxine, who said quit kidding yourself, Buster, they're watching all the time, they play little tricks like this.

And here were facts.

Facts he should send home to Morley.

Except he couldn't send them.

Facts that he was ashamed to send.

You couldn't write:

We are pets. The children house and feed us. They throw sticks for us to chase. They like to hear us bark—

He sweated as he thought of it.

Or the kinder fact:

We are playmates—

You couldn't write that, either.

You simply couldn't write it.

And yet, he said, the facts are there —the truth is there.

And you must admit it. You must admit the fact. And you must admit the truth.

If not for Morley, if not for Earth, if not for fellow man, then you must admit it for yourself.

For a man may fool his friends, he may deceive the world—but he must be truthful with himself.

Let's forget the bitterness, he told himself—the bitterness and hurt. Let's forget the pride.

Let us look for facts.

The Kimonians are a race more culturally advanced than we are, which means, in other words, that they are farther along the road of evolution, farther from the ape. And what does it take to advance along the evolutionary road beyond the high tide of my own race of Earth?

Not mere intelligence alone, for that is not enough.

What then would it take to make the next major stride in evolution?

Perhaps philosophy rather than intelligence—a seeking for a way to

put to better use the intelligence that one already had, a greater understanding and a more adequate appreciation of human values in relation to the universe.

And if the Kimonians had that greater understanding, if they had won their way through better understanding to closer brotherhood with the galaxy, then it would be inconceivable that they'd take the members of another intelligent race to serve as puppy dogs for children. Or even as playmates for their children, unless in the fact of playing with their children there be some greater value, not to their child alone, but to the child of Earth, than the happiness and wonder of such association. They would be alive to the psychic damage that might be done because of such a practice, would not for a moment run the danger of that damage happening unless out of it might come some improvement or some change.

He sat and thought of it and it seemed right, for even on his native planet history showed increasing concern with social values with the improvement of the culture.

And something else.

Parapsychic powers must not come too soon in human evolution, for they could be used disastrously by a culture that was not equipped, emotionally and intellectually, to handle them. No culture which had not reached an adult stage could have parapsychic powers, for they were nothing to be fooled around with by an adolescent culture.

In that respect at least, Bishop told himself, the Kimonians are the adults and we are the adolescents. In comparison with the Kimonians, we have no right to consider ourselves any more than children.

It was hard to take.

He gagged on it.

Swallow it, he told himself. Swallow it.

The cabinet said: "It is late, sir. You must be getting tired."

"You want me to go to bed?"

"It's a suggestion, sir."

"All right," he said.

He rose and started for the bedroom, smiling to himself.

Sent off to bed, he thought—just as a child is sent.

And going.

Not saying: "I'll go when I am ready."

Not standing on your adult dignity.

Not throwing a tantrum, not beating your heels upon the floor and howling.

Going off to bed—like a child when it is told to go.

Maybe that's the way, he thought. Maybe that's the answer. Maybe that's the *only* answer.

He swung around.

"Cabinet."

"What is it, sir?"

"Nothing," Bishop said. "Nothing at all . . . that is. Thanks for fixing up my hand."

"That's quite all right," said the cabinet. "Good night."

Maybe that's the answer.

To act like a child.

And what does a child do?

He goes to bed when he is told.

He minds his elders.

He goes to school.

He—

Wait a minute!

He goes to school!

He goes to school because there is a lot to learn. He goes to kindergarten so he can get into first grade and he goes to high school so he can go to college. He realizes there is a lot to learn, that before he takes his place in the adult world it must be learned and that he has to work to learn.

But I went to school, Bishop told himself. I went for years and years. I studied hard and I passed an examination that a thousand others failed to pass. I qualified for Kimon.

But just suppose;

You went to kindergarten to qualify for first grade.

You went to high school to qualify for college.

You went to Earth to qualify for Kimon.

You might have a doctorate on Earth, but still be no more than a kindergarten youngster when you got to Kimon.

Monty knew a bit of telepathy and so did some of the others. Maxine could teleport herself and she had made the glass stop before it hit the floor. Perhaps the others could, too.

And they'd just picked it up.

Although just telepathy or stopping a glass from hitting the floor would not be all of it. There'd be much more of it. Much more to the culture of Kimon than the parapsychic arts.

Maybe we are ready, he thought. Maybe we've almost finished with our adolescence. Maybe we are on the verge of being ready for an adult culture. Could that be why the Kimonians let us in, the only ones in the galaxy they are willing to let in?

His brain reeled with the thought.

On Earth only one of every thousand passed the examination that sent them on to Kimon. Maybe here on Kimon only another one in every thousand would be qualified to absorb the culture that Kimon offered them.

But before you could even start to absorb the culture, before you could start to learn, before you ever went to school, you'd have to admit that you didn't know. You'd have to admit that you were a child. You couldn't go on having tantrums. You couldn't be a wise guy. You couldn't keep on polishing up false pride to hold as a shield between you and the culture that waited for your understanding.

Morley, Bishop said, I may have the answer—the answer that you're awaiting back on Earth.

But I can't tell it to you. It's something that can't be told. It's a thing that each one must find out for himself.

And the pity of it is that Earth is not readily equipped to find it out. It is not a lesson that is often taught on Earth.

Armies and guns could not storm the citadel of Kimonian culture, for you simply could not fight a war with a parapsychic people. Earth aggressiveness and business cunning likewise would fail to crack the dead-pan face of Kimon.

There is only one way, Morley, Bishop said, talking to his friend. There is only one thing that will crack this planet and that is humility.

And Earthmen are not humble creatures.

Long ago they forgot the meaning of humility.

But here it's different.

Here you have to be different.

You start out by saying I don't know.

Then you say I want to know.

Then you say I'll work hard to learn.

Maybe, Bishop thought, that's why they brought us here, so that the one of us in every thousand who has a chance of learning would get that chance to learn. Maybe they are watching, hoping that there may be more than one in every thousand. Maybe they are more anxious for us to learn than we are to learn. For they may be lonely in a galaxy where there are no others like them.

Could it be that the ones at this hotel were the failures, the ones who had never tried, or who might have tried and could not pass.

And the others—the one out of every thousand—where were they?

He could not even guess.

There were no answers.

It all was supposition.

It was a premise built upon a pipe-dream—built on wishful thinking.

He'd wake up in the morning and know that it was wrong.

He'd go down to the bar and have a drink with Maxine or with Monty and laugh at himself for the things that he'd dreamed up.

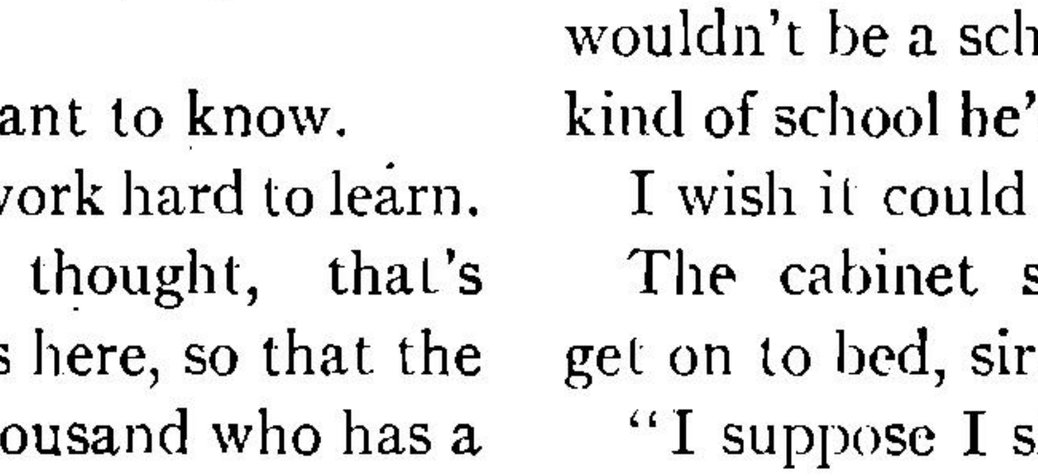
School, he'd told himself. But it wouldn't be a school—at least not the kind of school he'd ever known before.

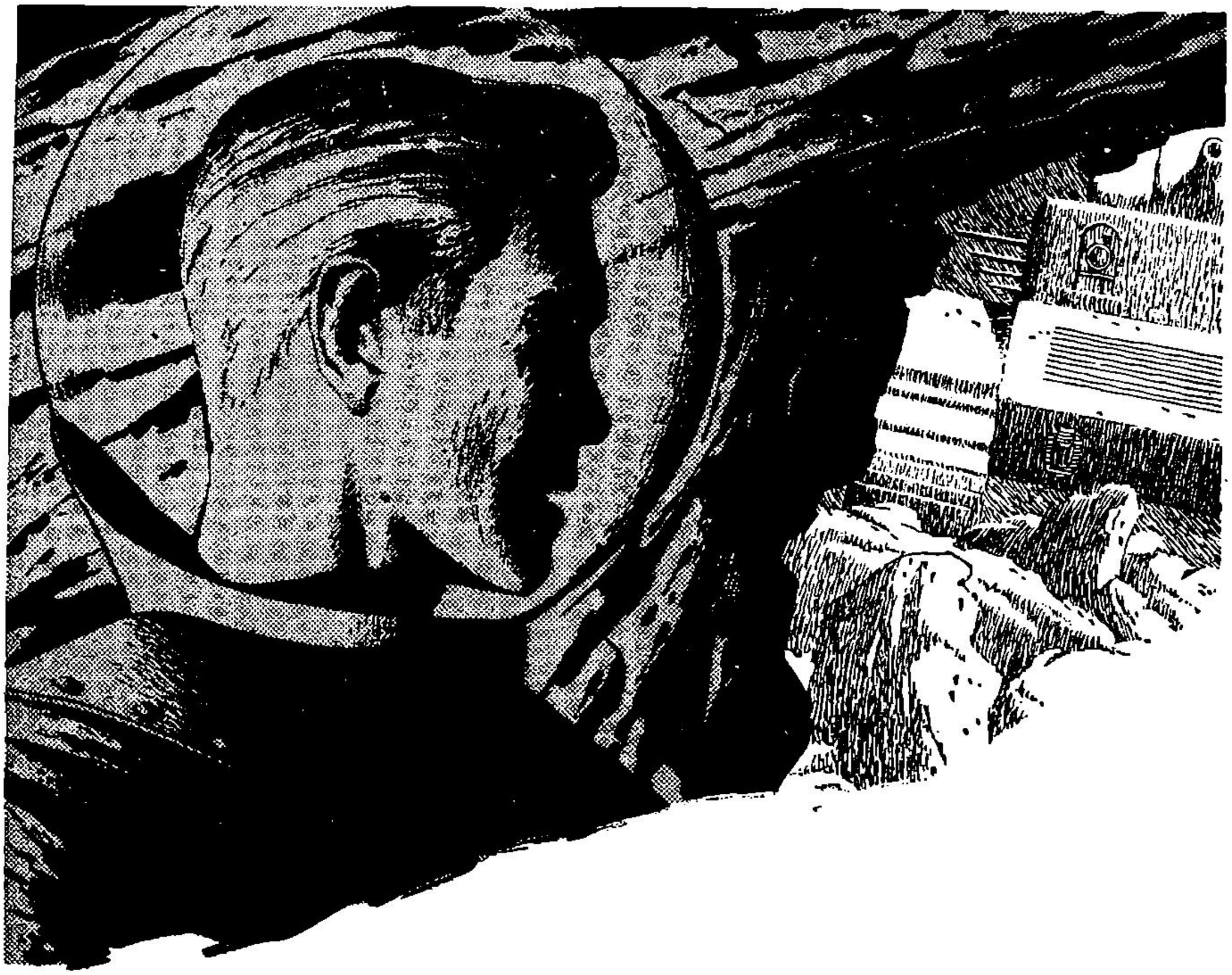
I wish it could be so, he thought.

The cabinet said, "You'd better get on to bed, sir."

"I suppose I should," said Bishop. "It's been a long, hard day."

"You'll want to get up early," said the cabinet, "so you aren't late to school."





Illustrated by van Dongen

BY WALTER M. MILLER, JR.

I MADE YOU

The trouble with a machine capable of independent self-adjusting operation is, of course, that it may get out of adjustment in a way it decides to maintain—and you can't change!

It had disposed of the enemy, and it was weary. It sat on the crag by night. Gaunt, frigid, wounded, it sat under the black sky and listened to the land with its feet, while only its dishlike ear moved in slow patterns that searched the surface of the land and the sky. The land was silent, airless. Nothing moved, except the feeble thing that scratched in the cave. It was good that nothing moved. It hated sound and motion. It was in its nature to hate them. About the thing in the cave, it could do nothing until

dawn. The thing muttered in the rocks—

"Help me! Are you all dead? Can't you hear me? This is Sawyer. Sawyer calling anybody, Sawyer calling anybody—"

The mutterings were irregular, without pattern. It filtered them out, refusing to listen. All was seeping cold. The sun was gone, and there had been near-blackness for two hundred and fifty hours, except for the dim light of the sky-orb which gave no food, and the stars by which it told the time.

It sat wounded on the crag and expected the enemy. The enemy had come charging into the world out of the unworld during the late afternoon. The enemy had come brazenly, with neither defensive maneuvering nor offensive fire. It had destroyed them easily—first the big lumbering enemy that rumbled along on wheels, and then the small enemies that scurried away from the gutted hulk. It had picked them off one at a time, except for the one that crept into the cave and hid itself beyond a break in the tunnel.

It waited for the thing to emerge. From its vantage point atop the crag, it could scan broken terrain for miles around, the craters and crags and fissures, the barren expanse of dust-flat that stretched to the west, and the squarish outlines of the holy place near the tower that was the center of the world. The cave lay at the foot of a cliff to the southeast, only a thousand yards from the crag. It could guard the entrance to the cave with its small spitters, and there was no escape for the lingering trace of enemy.

It bore the mutterings of the hated thing even as it bore the pain of its wounds, patiently, waiting for a time of respite. For many sunrises there had been pain, and still the wounds were unrepaired. The wounds dulled some of its senses and crippled some of its activators. It could no longer follow the flickering beam of energy that would lead it safely into the unworld and across it to the place of creation. It could no longer blink out the pulses that reflected the difference between healer and foe. Now there was only foe.

"Colonel Aubrey, this is Sawyer. Answer me! I'm trapped in a supply cache! I think the others are dead. It blasted us as soon as we came near. Aubrey from Sawyer, Aubrey from Sawyer. Listen! I've got only one cylinder of oxygen left, you hear? Colonel, answer me!"

Vibrations in the rock, nothing more—only a minor irritant to disturb the blessed stasis of the world it guarded. The enemy was destroyed, except for the lingering trace in the cave. The lingering trace was neutralized however, and did not move.

Because of its wounds, it nursed a brooding anger. It could not stop the damage signals that kept firing from its wounded members, but neither could it accomplish the actions that

the agonizing signals urged it to accomplish. It sat and suffered and hated on the crag.

It hated the night, for by night there was no food. Each day it devoured sun, strengthened itself for the long, long watch of darkness, but when dawn came, it was feeble again, and hunger was a fierce passion within. It was well, therefore, that there was peace in the night, that it might conserve itself and shield its bowels from the cold. If the cold penetrated the insulating layers, thermal receptors would begin firing warning signals, and agony would increase. There was much agony. And, except in time of battle, there was no pleasure except in devouring sun.

To protect the holy place, to restore stasis to the world, to kill enemy—these were the pleasures of battle. It knew them.

And it knew the nature of the world. It had learned every inch of land out to the pain perimeter, beyond which it could not move. And it had learned the surface features of the demiworld beyond, learned them by scanning with its long-range senses. The world, the demiworld, the unworld—these were Outside, constituting the universe.

"*Help me, help me, help me! This is Captain John Harbin Sawyer, Autocyber Corps, Instruction and Programming Section, currently of Salvage Expedition Lunar-Sixteen. Isn't anybody alive on the Moon? Listen! Listen to me! I'm sick. I've been here God knows how many days . . . in a suit. It stinks. Did you ever live in a suit for days? I'm sick. Get me out of here!*"

The enemy's place was unworld. If the enemy approached closer than the outer range, it must kill; this was a basic truth that it had known since the day of creation. Only the healers might move with impunity over all the land, but now the healers never came. It could no longer call them nor recognize them—because of the wound.

It knew the nature of itself. It learned of itself by introspecting damage, and by internal scanning. It alone was "being." All else was of the outside. It knew its functions, its skills, its limitations. It listened to the land with its feet. It scanned the surface with many eyes. It tested the skies with a flickering probe. In the ground, it felt the faint seisms and random noise. On the surface, it saw the faint glint of starlight, the heat-loss from the cold terrain, and the reflected pulses from the tower. In the sky, it saw only stars, and heard only the pulse-echo from the faint orb of Earth overhead. It suffered the gnawings of ancient pain, and waited for the dawn.

After an hour, the thing began crawling in the cave. It listened to the faint scraping sounds that came through the rocks. It lowered a more sensitive pickup and tracked the sounds. The remnant of enemy was

crawling softly toward the mouth of the cave. It turned a small spitter toward the black scar at the foot of the Earthlit cliff. It fired a bright burst of tracers toward the cave, and saw them ricochet about the entrance in bright but noiseless streaks over the airless land.

"*You dirty greasy deadly monstrosity, let me alone! You ugly juggernaut, I'm Sawyer. Don't you remember? I helped to train you ten years ago. You were a rookie under me . . . heh heh! Just a dumb autocyber rookie . . . with the firepower of a regiment. Let me go. Let me go!*"

The enemy-trace crawled toward the entrance again. And again a noiseless burst of machine-gun fire spewed about the cave, driving the enemy fragment back. More vibrations in the rock—

"*I'm your friend. The war's over. It's been over for months . . . Earthmonths. Don't you get it, Grumbler? 'Grumbler'—we used to call you that back in your rookie days—before we taught you how to kill. Grumbler. Mobile autocyber fire control. Don't you know your pappy, son?*"

The vibrations were an irritant. Suddenly angry, it wheeled around on the crag, gracefully manuevering its massive bulk. Motors growling, it moved from the crag onto the hillside, turned again, and lumbered down the slope. It charged across the flatlands and braked to a halt fifty yards from the entrance to the cave. Dust geysers sprayed up about its caterpillars and fell like jets of water in the airless night. It listened again. All was silent in the cave.

"*Go 'way, sonny,*" quavered the vibrations after a time. "*Let pappy starve in peace.*"

It aimed the small spitter at the center of the black opening and hosed two hundred rounds of tracers into the cave. It waited. Nothing moved inside. It debated the use of a radiation grenade, but its arsenal was fast depleting. It listened for a time, watching the cave, looming five times taller than the tiny flesh-thing that cowered inside. Then it turned and lumbered back across the flat to resume its watch from the crag. Distant motion, out beyond the limits of the demiworld, scratched feebly at the threshold of its awareness—but the motion was too remote to disturb.

The thing was scratching in the cave again.

"*I'm punctured, do you hear? I'm punctured. A shard of broken rock. Just a small leak, but a slap-patch won't hold. My suit! Aubrey from Sawyer, Aubrey from Sawyer. Base Control from Moonwagon Sixteen, Message for you, over. He he. Gotta observe procedure. I got shot! I'm punctured. Help!*"

The thing made whining sounds for a time, then: "*All right, it's only my leg. I'll pump the boot full of water and freeze it. So I lose a leg. Whatthehell, take your time.*" The vibrations subsided into whining sounds again.

It settled again on the crag, its activators relaxing into a lethargy that was full of gnawing pain. Patiently it awaited the dawn.

The movement toward the south was increasing. The movement nagged at the outer fringes of the demiworld, until at last the movement became an irritant. Silently, a drill slipped down from its belly. The drill gnawed deep into the rock, then retracted. It slipped a sensitive pickup into the drill hole and listened carefully to the ground.

A faint purring in the rocks—mingled with the whining from the cave.

It compared the purring with recorded memories. It remembered similar purrings. The sound came from a rolling object far to the south. It tried to send the pulses that asked "Are you friend or foe," but the sending organ was inoperative. The movement, therefore, was enemy—but still beyond range of its present weapons.

Lurking anger, and expectation of battle. It stirred restlessly on the crag, but kept its surveillance of the cave. Suddenly there was disturbance on a new sensory channel, vibrations similar to those that came from the cave; but this time the vibrations came across the surface, through the emptiness, transmitted in the long-wave spectra.

"*Moonwagon Sixteen from Command Runabout, give us a call. Over.*"

Then silence. It expected a response from the cave, at first—since it knew that one unit of enemy often exchanged vibratory patterns with another unit of enemy. But no answer came. Perhaps the long-wave energy could not penetrate the cave to reach the thing that cringed inside.

"*Salvage Sixteen, this is Aubrey's runabout. What the devil happened to you? Can you read me? Over!*"

Tensely it listened to the ground. The purring stopped for a time as the enemy paused. Minutes later, the motion resumed.

It awoke an emissary ear twenty kilometers to the southwest, and commanded the ear to listen, and to transmit the patterns of the purring noise. Two soundings were taken, and from them, it derived the enemy's precise position and velocity. The enemy was proceeding to the north, into the edge of the demiworld. Lurking anger flared into active fury. It gunned its engines on the crag. It girded itself for battle.

"*Salvage Sixteen, this is Aubrey's runabout. I assume your radio rig is inoperative. If you can hear us, get this: we're proceeding north to five miles short of magnapult range. We'll stop there and fire an autocyb rocket into zone Red-Red. The warhead's a radio-to-sonar transceiver. If you've got a seismitter that's working, the transceiver will act as a relay stage. Over.*"

It ignored the vibratory pattern and rechecked its battle gear. It introspected its energy storage, and tested its weapon activators. It summoned an emissary eye and waited a

dozen minutes while the eye crawled crablike from the holy place to take up a watch-post near the entrance of the cave. If the enemy remnant tried to emerge, the emissary eye would see, and report, and it could destroy the enemy remnant with a remote grenade catapult.

The purring in the ground was louder. Having prepared itself for the fray, it came down from the crag and grumbled southward at cruising speed. It passed the gutted hulk of the Moon-wagon, with its team of overturned tractors. The detonation of the magnapult canister had broken the freight-car sized vehicle in half. The remains of several two-legged enemy appurtenances were scattered about the area, tiny broken things in the pale Earthlight. Grumbler ignored them and charged relentlessly southward.

A sudden wink of light on the southern horizon! Then a tiny dot of flame arced upward, traversing the heavens. Grumbler skidded to a halt and tracked its path. A rocket missile. It would fall somewhere in the east half of zone Red-Red. There was no time to prepare to shoot it down. Grumbler waited—and saw that the missile would explode harmlessly in a nonvital area.

Seconds later, the missile paused in flight, reversing direction and sitting on its jets. It dropped out of sight behind an outcropping. There was no explosion. Nor was there any activity in the area where the missile had fallen. Grumbler called an emissary ear, sent it migrating toward the impact point to listen, then continued South toward the pain perimeter.

"*Salvage Sixteen, this is Aubrey's runabout,*" came the long-wave vibrations. "*We just shot the radio-seismitter relay into Red-Red. If you're within five miles of it, you should be able to hear.*"

Almost immediately, a response from the cave, heard by the emissary ear that listened to the land near the tower: "*Thank God! He he he he—Oh, thank God!*"

And simultaneously, the same vibratory pattern came in long-wave patterns from the direction of the missile-impact point. Grumbler stopped again, momentarily confused, angrily tempted to lob a magnapult canister across the broken terrain toward the impact point. But the emissary ear reported no physical movement from the area. The enemy to the south was the origin of the disturbances. If it removed the major enemy first, it could remove the minor disturbances later. It moved on to the pain perimeter, occasionally listening to the meaningless vibrations caused by the enemy.

"*Salvage Sixteen from Aubrey. I hear you faintly. Who is this, Carhill?*"

"*Aubrey! A voice—A real voice—Or am I going nuts?*"

"*Sixteen from Aubrey, Sixteen from Aubrey. Stop babbling and tell me who's talking. What's happening in there?*

Have you got Grumbler immobilized?"

Spasmodic choking was the only response.

"Sixteen from Aubrey. Snap out of it! Listen, Sawyer, I know it's you. Now get hold of yourself, man! What's happened?"

"Dead . . . they're all dead but me."

"STOP THAT IDIOTIC LAUGHING!"

A long silence, then, scarcely audible: *"O.K., I'll hold onto myself. Is it really you, Aubrey?"*

"You're not having hallucinations, Sawyer. We're crossing zone Red in a runabout. Now tell me the situation. We've been trying to call you for days."

"Grumbler let us get ten miles into zone Red-Red, and then he clobbered us with a magnapult canister."

"Wasn't your I.F.F. working?"

"Yes, but Grumbler's isn't. After he blasted the wagon, he picked off the other four that got out alive—He he he he . . . Did you ever see a Sherman tank chase a mouse, colonel?"

"Cut it out, Sawyer! Another giggle out of you, and I'll flay you alive."

"Get me out! My leg! Get me out!"

"If we can. Tell me your present situation."

"My suit . . . I got a small puncture—Had to pump the leg full of water and freeze it. Now my leg's dead. I can't last much longer."

"The situation, Sawyer, the situation! Not your aches and pains."

The vibrations continued, but Grumbler screened them out for a time. There was rumbling fury on an Earthlit hill.

It sat with its engines idling, listening to the distant movements of the enemy to the south. At the foot of the hill lay the pain perimeter; even upon the hilltop, it felt the faint twinges of warning that issued from the tower, thirty kilometers to the rear at the center of the world. It was in communion with the tower. If it ventured beyond the perimeter, the communion would slip out-of-phase, and there would be blinding pain and detonation.

The enemy was moving more slowly now, creeping north across the demiworld. It would be easy to destroy the enemy at once, if only the supply of rocket missiles were not depleted. The range of the magnapult hurler was only twenty-five kilometers. The small spitters would reach, but their accuracy was close to zero at such range. It would have to wait for the enemy to come closer. It nursed a brooding fury on the hill.

"Listen, Sawyer, if Grumbler's I.F.F. isn't working, why hasn't he already fired on this runabout?"

"That's what sucked us in too, colonel. We came into zone Red and nothing happened. Either he's out of long-range ammo, or he's getting cagey, or both. Probably both."

"Mmmp! Then we'd better park here and figure something out."

"Listen . . . there's only one thing

you can do. Call for a telecontrolled missile from the Base."

"*To destroy Grumbler? You're out of your head, Sawyer. If Grumbler's knocked out, the whole area around the excavations gets blown sky high . . . to keep them out of enemy hands. You know that.*"

"*You expect me to care?*"

"*Stop screaming, Sawyer. Those excavations are the most valuable property on the Moon. We can't afford to lose them. That's why Grumbler was staked out. If they got blown to rubble, I'd be court-martialed before the debris quit falling.*"

The response was snarling and sobbing. "*Eight hours oxygen. Eight hours, you hear? You stupid, merciless—*"

The enemy to the south stopped moving at a distance of twenty-eight kilometers from Grumbler's hill—only three thousand meters beyond magnapult range.

A moment of berserk hatred. It lumbered to-and-fro in a frustrated pattern that was like a monstrous dance, crushing small rocks beneath its treads, showering dust into the valley. Once it charged down toward the pain perimeter, and turned back only after the agony became unbearable. It stopped again on the hill, feeling the weariness of lowered energy supplies in the storage units.

It paused to analyze. It derived a plan.

Gunning its engines, it wheeled slowly around on the hilltop, and glided down the northern slope at a stately pace. It sped northward for half a mile across the flatland, then slowed to a crawl and maneuvered its massive bulk into a fissure, where it had cached an emergency store of energy. The battery-trailer had been freshly charged before the previous sundown. It backed into feeding position and attached the supply cables without hitching itself to the trailer.

It listened occasionally to the enemy while it drank hungrily from the energy-store, but the enemy remained motionless. It would need every erg of available energy in order to accomplish its plan. It drained the cache. Tomorrow, when the enemy was gone, it would drag the trailer back to the main feeders for recharging, when the sun rose to drive the generators once again. It kept several caches of energy at strategic positions throughout its domain, that it might never be driven into starved inability to act during the long lunar night. It kept its own house in order, dragging the trailers back to be recharged at regular intervals.

"*I don't know what I can do for you, Sawyer,*" came the noise of the enemy. "*We don't dare destroy Grumbler, and there's not another autocyber crew on the Moon. I'll have to call Terra for replacements. I can't send men into zone Red-Red if Grumbler's running berserk. It'd be murder.*"

"*For the love of God, colonel—!*"

"Listen, Sawyer, you're the autocyber man. You helped train Grumbler. Can't you think of some way to stop him without detonating the mined area?"

A protracted silence. Grumbler finished feeding and came out of the fissure. It moved westward a few yards, so that a clear stretch of flat land lay between itself and the hill at the edge of the pain perimeter, half a mile away. There it paused, and awoke several emissary ears, so that it might derive the most accurate possible fix of the enemy's position. One by one, the emissary ears reported.

"Well, Sawyer?"

"My leg's killing me."

"Can't you think of anything?"

"Yeah—but it won't do me any good. I won't live that long."

"Well, let's hear it."

"Knock out his remote energy storage units, and then run him ragged at night."

"How long would it take?"

"Hours—after you found all his remote supply units and blasted them."

It analyzed the reports of the emissary ears, and calculated a precise position. The enemy runabout was 2.7 kilometers beyond the maximum range of the magnapult—as creation had envisioned the maximum. But creation was imperfect, even inside.

It loaded a canister onto the magnapult's spindle. Contrary to the intentions of creation, it left the canister *locked to the loader*. This would cause pain. But it would prevent the canister from moving during the first few microseconds after the switch was closed, while the magnetic field was still building toward full strength. It would not release the canister until the field clutched it fiercely and with full effect, thus imparting slightly greater energy to the canister. This procedure it had invented for itself, thus transcending creation.

"Well, Sawyer, if you can't think of anything else—"

"I DID THINK OF SOMETHING ELSE!" the answering vibrations screamed. *"Call for a telecontrolled missile! Can't you understand, Aubrey? Grumbler murdered eight men from your command."*

"You taught him how, Sawyer."

There was a long and ominous silence. On the flat land to the north of the hill, Grumbler adjusted the elevation of the magnapult slightly, keyed the firing switch to a gyroscope, and prepared to charge. Creation had calculated the maximum range when the weapon was at a standstill.

"He he he he he—" came the patterns from the thing in the cave.

It gunned its engines and clutched the drive-shafts. It rolled toward the hill, gathering speed, and its mouth was full of death. Motors strained and howled. Like a thundering bull, it rumbled toward the south. It hit maximum velocity at the foot of the slope. It lurched sharply upward. As the magnapult swept up to correct elevation, the gyroscope closed the circuit.

A surge of energy. The clenching fist of the field gripped the canister, tore it free of the loader, hurled it high over the broken terrain toward the enemy. Grumbler skidded to a halt on the hilltop.

"*Listen, Sawyer, I'm sorry, but there's nothing—*"

The enemy's voice ended with a dull snap. A flare of light came briefly from the southern horizon, and died.

"*He he he he he—*" said the thing in the cave.

Grumbler paused.

THRRUMMMP! came the shockwave through the rocks.

Five emissary ears relayed their recordings of the detonation from various locations. It studied them, it analyzed. The detonation had occurred less than fifty meters from the enemy runabout. Satiated, it wheeled around lazily on the hilltop and rolled northward toward the center of the world. All was well.

"*Aubrey, you got cut off,*" grunted the thing in the cave. "*Call me, you coward . . . call me. I want to make certain you hear.*"

Grumbler, as a random action, recorded the meaningless noise of the thing in the cave, studied the noise, rebroadcast it on the long-wave frequency: "Aubrey, you got cut off. Call me, you coward . . . call me. I want to make certain you hear."

The seismitter caught the long-wave noise and reintroduced it as vibration in the rocks.

The thing screamed in the cave. Grumbler recorded the screaming noise, and rebroadcast it several times.

"*Aubrey . . . Aubrey, where are you . . . AUBREY! Don't desert me, don't leave me here—*"

The thing in the cave became silent.

It was a peaceful night. The stars glared unceasingly from the blackness, and the pale terrain was haunted by Earthlight from the dim crescent in the sky. Nothing moved. It was good that nothing moved. The holy place was at peace in the airless world. There was blessed stasis.

Only once did the thing stir again in the cave. So slowly that Grumbler scarcely heard the sound, it crawled to the entrance and lay peering up at the steel behemoth on the crag.

It whispered faintly in the rocks. "*I made you, don't you understand? I'm human. I made you—*"

Then with one leg dragging behind, it pulled itself out into the Earthglow and turned as if to look up at the dim crescent in the sky. Gathering fury, Grumbler stirred on the crag, and lowered the black maw of a grenade launcher.

"*I made you,*" came the meaningless noise.

It hated noise and motion. It was in its nature to hate them. Angrily, the grenade launcher spoke. And then there was blessed stasis for the rest of the night.

THE END

FINAL EXAM

BY ARTHUR ZIRUL

__Being shipwrecked__ on an alien planet has its discomforts—and problems. Like the problem of inducing the local natives, who happened to be divided into two armed camps, to let you get together again!

Illustrated by Arthur Sussman

The ship seemed to hang motionless above the great, green planet. The harsh, unfiltered light of the planet's mother star glinted on the silvery hull, highlighting the ragged edge of a huge hole in the stern of the vessel.

The occupants of the spaceship stood anxiously by their posts. Even the youngest novice among them knew that the ship had seen its last flight; it was finished. The engines were gone, vanished in the crackling horror of an atomic fire. The holocaust had begun accidentally in the fuel center. In a few milliseconds the screaming flames had torn through the main bulkheads, following the fuel lines to the stern exhaust ports, destroying everything in their path. In a flash of hellish fire it was all over. Only the isolated control deck, where the few survivors now stood, remained intact.

It was only a matter of hours till the magnetic claws of the planet would pull the ship down, faster and faster, until the friction against the atmosphere would turn it into a molten, pitted mass—unrecognizable save as its component elements.

Each individual stood alone with his thoughts, separated from his neighbors by the cold inches of the space armor he wore. The atmosphere had long since hissed away through the gaping wounds in the ship. The vessel was tomb silent without it. Only the suit intercoms kept them in communications.

The chief engineer, stationed by his useless panel, studied the young second navigator for a moment. The youngster was tense, nervous; his features through the glass of his armor revealed the fear that chewed at his control.

"Take it easy boy," the engineer beamed at him through the intercom. "We're lucky, you know."

"Lucky?" the navigator shouted. "You call this lucky? Dying on some lump parsecs from home! If that's luck, you can stick it in your stern tubes!"

"Lucky," the engineer repeated. "This planet might not have been so convenient. We might have drifted in an orbit around that sun until our suit tanks gave out; and then—"

"Oh shut up!" The navigator turned quickly and walked to his table. He began checking his instruments in a vain attempt to be doing something. Suddenly he raised his head, and with his voice barely under control, cried:

"Why doesn't the skipper say something? What's he doing in that cabin?"

"Maybe he's saying his prayers," the engineer smirked.

The navigator threw his sextant viciously against the bulkhead.

"Shut up, I said!" he snapped.

"Now hear this! Now hear this!"

Each crewman straightened as the general call activated his individual receiver.

"The captain will address the crew. Attention, please."

There was a pause, then the familiar voice of the skipper came through.

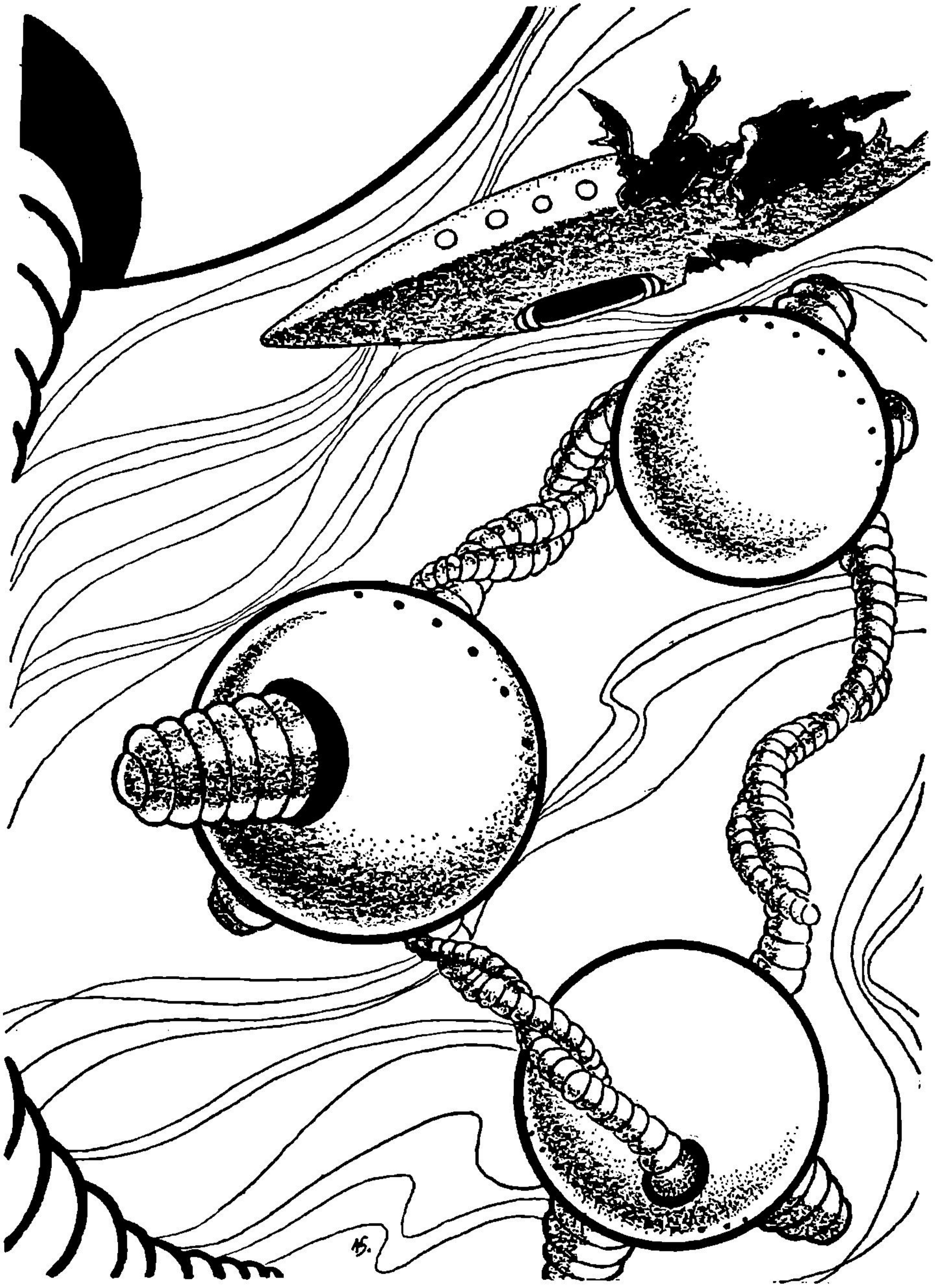
"Men, there is no need for me to remind you of the gravity of our situation. We have no power, and as we are without communications our chances for immediate rescue are practically nonexistent. The situation, however, is not entirely hopeless."

The crew stirred in surprise and a murmur echoed through the intercom.

"As you know, we were blown off our course by the blast recoil. We are in a strange sector being drawn into the planet below us. The planetologist informs me that this world has an atmosphere similar to that of our home planet. The gravity and vegetation, too, are very similar. In short, if need be, we can manage to survive there. Even more important than that, however, we have discovered signs of a highly developed culture. The alien sociologist tells me that this planet shows all the earmarks of a seventh-level culture. If that is true, then it means we might very well be able to obtain aid in returning home!"

The babble in the phones grew to a hopeful crescendo for a moment before the captain's voice resumed.

"Do not become too optimistic however; we have a serious problem before us first. Since we have no power, our ship's degravitators are useless; therefore if we are to manage



a landing at all we must rely upon our suit degravitators. In short, we will abandon ship just as soon as we enter the atmosphere.

"Since our course carries us on a shallow tangent with the planet, and our atmospheric speed will exceed several thousand units per hour, we will be widely scattered when we land. Also contributing to our wide dispersion will be the high surface winds of the planet. Even if we leave as quickly as possible to negate the other difficulties, the winds will fling us to all points of the compass; especially as we will be nearly weightless with our degravitators on. It is quite possible that we may be separated by as much as the diameter of the planet.

"In order that we maintain as much fighting force as possible we will tie ourselves together in groups of three; more than that may prove cumbersome and dangerous. Some of the groups may be lost in the oceans. Some may die elsewhere in landing. I can only hope and pray that we all make it.

"The chief navigator will issue maps to each group designating the rendezvous point on the planet for the entire crew. Proceed to that point as quickly as possible, by any means that you can manage. Good luck for now, and God be with you."

There was a faint click as the captain signed off. His voice in the intercom was replaced by the excited babble of the crew.

"All right men, knock it off!" the chief navigator ordered through the phones. "Here's the dope on this operation."

He walked among the crew handing out the freshly printed maps. The first officer spoke next.

"There are fifteen of us left; you will separate into groups of three, according to alphabetical order. Each group will tie themselves together with their emergency lines. When you are ready, arrange yourselves in jump order by the forward escape hatch and the main lock. Three groups to the locks, two to the hatch. You will stand by for degrav and jump signals. Any questions?"

"Yes, sir," the junior navigator said. "Do we have to turn our degravitators on right away? Can't we fall a while and then switch them on just before we land? That way we'll be surer of narrowing our landing area, and of staying together."

"I see you've never used escape gear before," the first said a little impatiently. "Those suit degravitators work in inverse proportion to the height of the fall. The further you fall, the slower you go. The unit needs distance to build up its field. These suit jobs are uncontrollable. They have only one setting and that's 'on.' You'll need all the height you can get if you hope to build up any weightlessness with these 'One-lungers.'

If you're not careful, you'll wind up spread out like a quart of jam in a 10-G pull out. Any other questions?"

"N-No, sir," the young officer stammered.

"All right then, hop to, you birds," the first ordered. "Be ready to shove off at count-off signal from the captain. The captain, the chief navigator, and myself will leave last through the escape hatch. Remember, rendezvous as quickly as possible. We will maintain the rendezvous point for ten time-cycles; about forty light-periods on this planet. If you can't get back by then, you're on your own. Stand by for count off!"

The groups were quickly formed and tied together. They waited tensely by the hatches for the signal that would send them out and down to the unknown world below. The captain's voice clicked on again.

"Ready now men, we will enter atmosphere in ten centiunits. Stand by for count-off from five centiunits after entrance."

They waited in their little groups, arms about each other resembling small football huddles, the better to keep them in one tight mass when they left ship. The first faint whistle of the upper atmosphere through the hole in the stern alerted them for the count off.

"Ready! Degravs on!" the captain's voice tinned through their earphones. "Five . . . four . . . three . . . two . . . one . . . NOW!"

Like spilled fruit the groups tumbled out of the hatches. In a few seconds they were all out and caught in the grip of the upper air currents. The winds snatched them up, tumbled them about like multi-legged bowling balls, and whipped them away into the blue distance even before their degravitator fields had reached full effect. By the time they had reached five thousand feet they had decelerated to a gentle fall. By then, however, they had been so widely scattered by the winds that no one group was in sight of another.

Two of the groups fell in the Pacific Ocean in the midst of a tropical storm. One of them washed up on the beach of Kauai Island, in the Hawaiian group, several hours later. More dead than alive, they managed to crawl out of their buoyant suits and into the palm jungle. The other group was lost forever in the wild sea. One landed in North America; in a suburb of New York. Another fell in the deserted, frozen wastes of Antartica. They were forced to leave the warm safety of their suits when their power packs ran out. They froze to death soon afterwards. The last group alighted near Kamkov, a small village in East Russia.

Alma, Amika, and Babla, the three members of the first group to jump, were sitting huddled by the bole of a Royal Palm tree intensely studying the map spread out before them.

They paid scant attention to the warm beauty of the Hawaiian island about them. Their recent ordeal in the ocean had left their aesthetic senses somewhat dulled. They were still weak, though a few meals of coconuts and berries had added a good deal to their vigor.

"According to this map," Amika pointed, "we're a helluva distance from rendezvous point, almost a quarter of the circumference of this globe I'd say."

"Most of that distance is water, too," Alma observed. "After our tuss'e with that insane ocean I'll be blasted if I'll swim it."

"We'll have to try contacting the nearest intelligent life, and ask for help," Babla said, as he rose and looked over the sunny beach.

"Do you think that's wise?" Amika asked, as Babla shot him a cold glance. "That is to say, I realize that you're a trained alien sociologist and I'm just a crummy radio op, but I'd still hate to end up stuffed, in some barbarian's museum."

"We made a very careful study of this planet through our scopes before we landed," Babla lectured a trifle coolly. "We discovered unmistakable signs of a very advanced culture. In fact, the captain placed our rendezvous point on the outskirts of the biggest city we could find; so that we could get assistance from the most obvious source—where the most inhabitants are.

"Need I remind you that the prime order of your *Interstellar Manual* states, in effect, when in need of aid contact the first intelligent species that possesses at least a fifth-level culture. A fifth-level, or higher culture, may be identified by the architectural criteria illustrated in the manual. The theory is simple; any culture advanced enough to build a fifth-level structure can be trusted to be intelligent enough to recognize your predicament and to offer aid.

"You must, of course, be extremely wary of barbaric, moron-level cultures; they understand only brute force. However, you may feel secure in the knowledge that once you identify an advanced culture you need not fear barbarians; the planet has by then progressed enough to have left its savage stages behind."

"That's all well and good for *our* star system," Alma argued, "but remember, we're in mighty strange waters; in fact we're here purely by accident. As far as I know, nobody has ever seen this part of the galaxy before."

"You talk like a child!" Babla snapped. "What held true on the more than one hundred planets we have occupied most certainly will hold true here. Enough of this nonsense, let's get moving before darkness or we'll never get to rendezvous point! Follow me, I think I see a road over there past that grove of trees."

The two spacemen rose slowly and

followed behind Babla as he led the way to the single-lane dirt road ahead.

Mike Honosura sat comfortably in a rocking chair on the front porch of his general store. He puffed lazily at his pipe and blew gray clouds into the dazzling Pacific sunset.

Lovely island, Kauai, he thought. *Too bad my honorable grandparents chose to remain in Japan. They would have liked it here.*

His flat, Oriental face was turned towards the road; he liked to watch the workers come in from the cane fields at night. Wiamea wasn't much of a town, even for Kauai; but at least it offered some recreation. The workers liked it. They weren't anywhere as fussy as the tourists, for which Honosura was most thankful. A movement in the bushes alongside the road caught his eye. He turned in time to see the three aliens step out onto the road. His eyes widened till they threatened to rupture the lids. His pipe fell from his suddenly slack-jawed mouth and clattered unheeded to the floor.

"My most Honorable Ancestral Gods," he half whispered, "protect me!"

Ilitch Pilitrovsky surveyed his little farm from the doorway of his thatched roof hut. The commissar of agriculture had permitted him to keep the land, mainly because it was too isolated on its rocky hillside to have been made part of the collective farm for the district. Ilitch's arrangement with the State was simple: He did all the work and they shared the crop with him. They let him keep all he could eat. At the moment Ilitch was daydreaming about the crop due for harvest. His eyes rested lovingly on the fat, waving grain.

"Ah, they will be proud of me this year," he mused. "I shall have the biggest crop in the district, now, if only I didn't have to give so much to the commissar, I could—"

He immediately put up his almost automatic mind censor and looked nervously about as if expecting the secret police to pop out of a haystack.

"Ilitch!" his wife called from inside the hut. "Come in to eat before the soup gets cold. What are you dreaming about out there?"

"Nothing, my love." Ilitch sighed, as he looked in at his wife. She was a big woman, big as Melna, his horse. He had fallen in love with her the day he had seen her pitch four wagonloads of hay in a row. Now he found himself wondering if perhaps there weren't other things about a woman that mattered also. He remembered seeing an American magazine during the war; the women in those pictures —weak as kittens, but, by Stalin, what—

The mind censor clicked in again.

As Ilitch turned to go in he chanced to look up. He stopped stock-still there in the doorway. Slowly floating

down to his farm were three metal balls with corrugated tubes sticking out of them like arms and legs. The "arm" tubes were entwined about each other so that the three balls looked liked children at play. Ilitch's eyes followed them down while the rest of him stood there as if carved. They came to a gentle, vibrationless stop not ten feet from where he stood. The balls separated from each other almost immediately. A small glass section in the front of each began to screw outwards.

Cakna, Drul, and Druit climbed out of their suits and stretched thankfully. Almost as soon as they saw Ilitch, they went for their sidearms. Ilitch's thatched hut was far from a fifth-level structure, and they weren't going to take chances with barbarians, particularly not barbarians that size. But they had no need for their weapons. Ilitch's staring eyes had suddenly become glassy; he slid down the door jamb, sat hard on the ground, and fell heavily forward in a dead faint.

The captain, the first officer, and the chief navigator landed closest to the rendezvous point. In fact, they were practically on it when they floated to Earth on a narrow strip of beach in the Gravesend section of Brooklyn. Since it was quite early in the morning at the time of their arrival, no one saw them land. By daylight, the three had shucked their spacesuits and were sitting on the beach munching their emergency rations. The captain spread out the map, studied it for a while and then looked down the bay towards Manhattan.

"Our rendezvous point is just a few land-units north of here. There's a small clearing at the entrance to the harbor where I planned for us to meet. Across the harbor, there's an island which is literally covered with seventh-level structures. We will make our contact with this planet's civilization there."

"Sir," the chief navigator said, "why don't we make our contact right here and now? I noticed a large number of seventh-level structures just a little to the east."

"We might," the captain nodded, "but I'd rather stick to interstellar protocol. We'll wait for the rest of the crew to assemble before we make formal contact. Besides, I'd like to consult with the alien sociologist about this culture—if his group made it, that is."

"Huge structures, aren't they, sir?" the first officer observed as he sat staring at the distant buildings.

"Yes," the captain agreed. "There must be millions of them in that city."

So engrossed were they with the skyline, they didn't see the little girl walking with schoolbooks in her arms on the sidewalk that paralleled the beach. They did hear her shriek of terror though and spun around with weapons at ready, in time to see her

running back in the direction from which she had come. Her schoolbooks lay discarded where she had dropped them in her wild flight.

"What in the name of Jeleval was that?" the first asked in a frightened whisper.

"Did you see it, sir?" the navigator turned to the captain.

"Yes, I saw it." The captain was visibly shaken.

The girl ran headlong into a patroling policeman. It took only a few hysterical words to send him racing back along the walk tugging under his blouse for his revolver.

"Listen! I think I hear it coming back!" the first reported.

"No, it's another one," the navigator said. "There it is now, coming towards us!"

The first cried, "Look at the size of the brute!"

The policeman skidded to a stop about ten yards from the trio. His face drained to a chalk-white for an instant; then he snapped his gun up to firing position. The first shot went wild and kicked sand into the captain's face.

"Take cover!" the captain yelled.

The three sprang apart with unbelievable swiftness, and flung themselves behind the nearest obstructions.

"Hold your fire," the captain commanded. "Maybe we can reason with it."

The policeman was debating with himself whether to go back for help, or to get the creatures by himself. He was no hero, but he shuddered to think of those things running loose in the city. Suddenly one of the creatures rose up from behind a rock and began to chatter unintelligibly at him. A .38 slug barely missed taking the captain's head off.

"Take him with your paralyzer!" the captain shouted at the first officer. "It's just our luck to run into an insane one."

The policeman barely saw the blue beam that penciled out of the officer's gun. With a choked gasp he fell hard to the beach and lay there, unmoving.

Mike Honosura breathed slowly. He could feel his heart hammering in his chest. He wanted to run, but the chill that radiated from his stomach seemed to freeze him where he sat. His eyes stayed riveted on the three beings as they waddled towards him. At first they looked like green, fuzz-covered beach balls, about two feet in diameter. As they drew closer he saw that they walked on short, purple stumps. Two fingered tentacles extended from under a small, saucer-eyed head that surmounted the ball shape. The creatures wore belts about the equators of their bodies. Fastened to the belts were several instruments; none of which Honosura was familiar with. Not that he was particularly interested in what they were wearing at the time.

When Alma, Amika, and Babla

first caught sight of Honosura sitting there they recoiled with almost as much horror as Honosura had when he first saw them.

"In all my experience," Babla said in a hushed voice, "I have never seen anything quite so terrifying. Can this be an example of the intelligent life native to this planet?"

"I doubt it." The radio operator nervously fingered his blast pistol. "Besides, even if it were, my bet is that it's barbarian. Look at those houses; they barely reach fourth-level, let alone fifth. I say shoot first and make apologies later."

"You're an idiot!" Babla barked. "I tell you we saw seventh-level structures on this planet. Use your reason, man, this place must represent some antiquated transitional phase from the lower levels. These creatures probably preserve it as some sort of museum. I personally assure you that seventh-level and fourth-level buildings simply do not coexist in the same culture. Now put up your blaster!"

Honosura began to move a little. He wanted to run more than he had ever wanted anything else before. He was just beginning to get his terror-frozen muscles under control again.

"Help! Help!" he screamed. "Call the sheriff! They are devils!"

"What do you suppose it wants?" Alma asked.

"Probably extending us some sort of greeting," Babla guessed. "I'll try talking to it, maybe it can take us to the local leaders."

At the sound of Babla's chatter Honosura stopped screaming and resumed staring.

"Better use interstellar sign talk," Alma nudged Babla. "I don't think it understands our language."

"Oh yes, stupid of me," Babla flustered. "I'll try sketches."

Babla began to draw a triangle in the dust of the road. His little experiment was cut short, however, by the sound of voices. Looking up, the three saw a herd of the terrestrials thundering down upon them.

"Hold your ground!" Babla ordered. "Don't show fear under any circumstances!"

Ilitch's wife, hearing the dull thud of her husband as he hit the ground, came out to investigate. One horrified shriek later she was bolting out of the rear door of the hut, over the fence, and on to the back of Melna, the horse, who had been quietly grazing in the field behind the house. With a shout and a kick the animal clattered off, almost as frightened as its mistress.

"Barbarians, no doubt of it," Cakna, the second navigator, stated with finality as he checked the loads in his blaster.

"Ah, the certainty of youth," Druit, the chief engineer, sighed. "I'll admit that they're ugly as sin, but did it ever occur to you, Cakna, that as

far as they're concerned we're no beauties either. As a matter of fact we're not even sure who the intellects around here are—barbarians or otherwise. There's a thing there in the doorway; another thing came out a moment ago, scrambled on top of still *another* thing, and beat it. Which one of the three represents the leading intelligence of the planet?"

"If any," Drul added. "Look, Cakna, I'll admit that this set-up looks strange, but let's remember that this is unexplored territory. We've never run into anything like it before —and neither has anyone else."

"Check," Druit agreed. "I say sit tight for a while. If the captain and the sociologist said that this is an advanced culture, I'll string along with their judgment."

"O.K. by me," Cakna shrugged as he opened the map. "I'll play it your way, but let's do some local checking first. According to this map, I'd say we're a long, long way from rendezvous. If we don't get rolling soon, we'll never make it in time."

"Maybe we can pick up something from that one," Druit suggested as he waved a tentacle towards Ilitch, who was still slumped in the doorway.

"Won't hurt trying," Cakna said as he folded his map and slipped the safety off on his blaster.

"*Tch, tch*, such nerves," Druit chided.

The three creatures approached Ilitch slowly, alert for any movement from the unconscious Russian.

"Big, isn't it?" Drul observed as they halted beside the man.

"Sure is!" Cakna said. "But why doesn't it move? None of us took a shot at it, and yet it lays there as if it had been hit by a cruiser-size paralyzer."

"You're ship's doctor, Drul," Druit said, "what's with it? Dead?"

"I doubt it, my guess is that it suffered a temporary nervous collapse when it first saw us. I guess we're pretty hard to take for an alien mind. Especially one that has had no experience with interstellar races. It's my personal opinion that it'll be coming around soon; at least I'm reasonably certain it isn't dead—too much body activity for that."

"In that case, I guess the best thing we can do," Druit proposed as he sucked his legs into his body till he was sitting on the ground, "is to stay put until this one wakes up or the other two return. We've got to make contact with someone if we're to get to rendezvous, and these are as likely candidates as any."

"I suppose you're right," Cakna sighed resignedly as he and Drul sat beside Druit. "Our best bet is to wait it out."

When Ilitch's wife thundered irreverently into the office of the village commissar screaming her wild story, that worthy gentleman was sorely tempted to have her taken away to a State liquidation center for the insane. He even considered sending her

husband along with her. He never did like Pilitrovsky anyway; besides he strongly suspected that Ilitch had been holding out grain. However, as the woman became more coherent, the commisar began to see that perhaps she had something there on her farm after all. He decided to investigate. If it turned out to be something big, he was sure to get a medal; if not, there was always Pilitrovsky to vent his rage upon.

And so it happened that a squad of pop-eyed Russian soldiers came upon Cakna, Druit, and Drul seated in a semicircle before a groggily conscious Pilitrovsky, drawing geometric figures in the dirt.

The captain and the navigator covered the first officer with their blasters as he slowly approached the prone policeman. He studied the man for a while and then turned to the others.

"It's out cold," he reported. "But you'd better stay back till I examine its weapon; never can tell what's in these things."

He picked up the policeman's revolver, examined it closely for a minute, opened the cylinder, and shook out the shells. He sniffed at the discharged cartridge case, rattled one of the unfired shells, and then finally, with extreme caution, he pried the slug out of its case with a pair of pliers from his belt. He spilled the powder out onto the sand and studied it for several seconds.

"All clear, sir!" he shouted as he turned to his companions. "Just a chemical explosive that propels a solid slug. Primitive, but deadly enough to kill us. I suggest we get back into our suits for safety's sake till we're a little surer of our ground."

"You're right," the captain said as he holstered his blaster. "For all I know, we've landed in the middle of an insane asylum. There may be more of those maniacs running around."

The trio returned to the armored spacesuits they had left by the edge of the sea, and climbed back inside them. They had barely locked their entrance plates and finished the operational check on their equipment when two police cars skid-marked to a stop in front of the beach sidewalk.

The schoolgirl had run home and had half frightened her mother to death with the story of what she had seen. The mother had immediately phoned the police who had responded with remarkable swiftness. Especially since they had already received two other calls from hysterical passersby who had seen the action on the beach from afar.

The police sergeant in charge of the operation was a tough old bird who had come up against many an unusual adversary in his day, but never anything like the three spacesuited aliens who confronted him now. He cocked the bolt of his sub-machine gun, and with two other policemen

covering him, he and his car companion slowly walked towards the beat patrolman who lay unconscious on the sand. They kept their eyes riveted on the three metal suits, ready to swing into action at the slightest movement from them. As they came abreast of the patrolman the sergeant's companion knelt to examine the man.

"How is he?" the sergeant asked anxiously.

"Seems to be O.K., just out," the other one said. He shifted his gaze back to the aliens. "What do we do now?"

"Get him back to safety," the sergeant ordered with a jerk of his thumb. "Then we'll see what we can do about opening them cans."

As the sergeant crouched behind a dead tree stump the other man carried the unconscious policeman back to the squad cars.

"All right now!" the sergeant shouted as soon as his men had taken adequate cover. "Come out of those things, keep your hands folded behind your heads, and move slow!"

There was no answer.

"Come out or we'll blow you out!" the sergeant shouted as he raised the machine gun.

The aliens still did not reply. Which wasn't too surprising, since they could make no sense at all of the policeman's speech.

"O.K., you asked for it!" The stuttering roar of the sergeant's gun climaxed his threat.

As the slugs spanged off his armor the captain decided to take a little positive action, on the chance that he could frighten what he considered mad creatures into a more reasonable state of action. He unlimbered his blaster and fired through a port in his armor. The atomic-headed slug vaporized the sergeant's tree stump and hurled him about twenty feet closer to the parked cars. Miraculously unhurt save for minor contusions he scrambled grotesquely for cover.

"Call headquarters!" he screamed at the radio cars. "Tell them to get a riot squad down here, and to call the army on it. These things are hot!"

Major Andrews reread the teletype he had just been handed. He pulled his mustache thoughtfully, put the message down, and picked up his desk phone.

"Hello, connect me with Captain Conner at G-2 please." He spoke quickly, almost stumbling over his words as he massaged the worry lines in his forehead.

"Hello, Captain Conner speaking," the phone announced.

"Conner?" The major sat up in his chair. "This is Andrews. I called to find out if you have received that report on those things we picked up near Fort Hamilton, in Brooklyn."

"Yes I did," Conner said. "I understand your boys had a job bringing

them in."

"Certainly did, we lost an armored car and a couple of acres of scenery before they ran out of ammo. We finally came up behind them with a landing barge and bulldozed them inside. The boys at Ordnance opened them up a few hours ago. The report covers what we found inside."

"Huh, this ought to fill a few Sunday supplements," Conner said.

"That's what I called you about, Conner." The major began to doodle nervously on his desk pad. "What's chances of keeping this out of the papers?"

"Too late," Conner said emphatically. "A couple of news camera men got there before the army did. The story is smeared over the front page of every daily in the country by now. What's up?"

"According to the Medical Department they're from outer space," Andrews explained as he sketched leaping flames on his pad. "They also appear willing to communicate. In fact, Major Flacs, our head psychiatrist, and his staff, have been interrogating them for an hour. We found out that there were four other groups, besides their own, that landed."

"Holy smoke!" Conner exclaimed. "Have you heard anything about the others?"

"Yes, I've just received a message from Schofield Barracks in Hawaii. We picked up another group of three in Wiamea, Kauai."

"Have any trouble?"

"No, not much. Luckily there was a sheriff and a couple of deputies to hold the crowd back. The things seemed amiable enough, just wanted information. Seems they wanted to know how to get to Owl's Head Park in Brooklyn."

"Of all places," Conner observed with a slight chuckle.

"They're being flown here now," Andrews said as he continued his doodling.

"Well, you don't sound exactly hysterical about it."

"I'm not. These creatures seem to have an extremely advanced scientific background. Judging from the effects of their sidearms at Gravesend, I can only guess at what their heavier weapons might be capable of. It's obvious that a government could make excellent use of any information they might care to offer."

"So?"

"So," Andrews drew a mushrooming atom-bomb plume, "we have two of those teams. Three others have landed elsewhere on this planet . . . I was just wondering where, that's all."

As Conner had said, the newspapers had the story and they had no intention of letting it go. Glaring headlines from coast to coast shouted the news that "mysterious saucer monsters" had been captured after a "titanic struggle" with the army in

Brooklyn, and were being held for questioning by the state department. All that the army and the state department could do after the news had leaked out was to sit tight and await developments. The first signs of the approaching diplomatic storm came the next morning when a crowd of couriers arrived at the state department, with sealed messages, from practically every embassy in Washington. The sum and substance of a typical message was an offer of scientific assistance, from the embassy's mother country, in the interrogation of the aliens. There was also a thinly veiled demand—if the assistance was not desired—for a representative to be present at every questioning session.

News photographers waited impatiently outside the Russian Embassy in order to photograph the courier they expected to leave with a message for the state department. No one was more surprised than the state department when no message was forthcoming. When there was still no message the second day, the conclusion reached by the state department was an obvious one.

"They must have one or more of the teams," Halwit, the secretary of state, said as he stared vacantly out of his office window.

Stevans, his assistant, nodded. "That is probably why they are keeping out of the public eye right now. I imagine that they will be around later in an attempt to bargain—trade information for information.

"I think you're right." Halwit frowned as he lit a cigarette. "From what we've been able to learn about the six we have, I'd say that they are the most important members of the crew. A point in our favor when it comes to trading information."

"Why should we trade?" Stevans asked archly.

"Have to," Halwit blew a smoke ring towards the ceiling, "no telling what *they* can find out. I think we'll have to arrange a meeting wherein we can question all members of the crew that were found, including the Russian ones, under U.N. supervision."

"Supposing they won't agree to it?" Stevans asked.

"Then we'd better start worrying," Halwit said as he carefully released another smoke ring.

Cakna, Druit, and Drúl were near the point of exhaustion. They had been questioned, probed, and examined for forty-eight hours with barely a let-up. If nothing else, the relentless questioning had resulted in a limited vocabulary which at least allowed for some degree of sensible communication, via the blackboard in the examination room. The language was a group of pictographs based on elementary physical laws. It gave both the Soviets and the aliens a dictionary of several dozen picture words consisting of such terms as: up, down; near, far; light, heavy, et cetera.

"What sort of unfeeling savages are these?" Cakna asked angrily, during a lull in the questioning. "We've already told them how we happened to be here, and how important it is for us to get to rendezvous as soon as possible, and what do they do? They question us for time-unit upon time-unit until I feel as if I've just been pulled out of a combustion chamber. Besides that, they haven't even offered us any food. What do they think we eat? Questions?"

"Cakna is right," Druit admitted grudgingly. "These creatures are, beyond a doubt, savages. But this advanced culture they evidently possess—it just doesn't jive with their barbarian personalities. I simply don't understand it."

"There *is* something gravely wrong on this planet," Drul said. "I have never, in all my experience, come up against anything quite so freakish in a socio-cultural pattern as this one. Perhaps Babla could explain it; I can't. A seventh-level culture coupled with a second-level, savage, personality make-up—frankly, it frightens me."

"Well," said Cakna, changing the subject, "it's all well and good theorizing about alien races, but I'm slowly starving to death. Let's try to get some food out of these things before I start chewing on *them!!*"

After attracting the Russians' attention by waving his tentacles, Cakna tried pointing at the toothed orifice in the middle of his round body to indicate that he wanted food. When it was evident that the Soviets didn't understand what he meant, he tried using the pictograph vocabulary to convey his meaning. The closest he could get to "eat" with the limited number of words at his disposal was to draw the symbols for "I live," and "I absorb." The Russians seemed to understand what he wanted then, and in a little while a wide variety of food and drink was set before the three.

"Are you sure they understood you?" Druit asked Cakna in an incredulous tone as he gazed at the fantastic spread of smoked fishes, caviars, vodka, and sweetmeats. "You don't suppose they actually eat this garbage, do you?"

"Oh, it's not as bad as all that," Drul said as he nibbled testily at a candied pear. "They're basically hydrocarbon life, as we are. This stuff may not be appetizing, but I think it's digestible. I suggest we eat what we can, who knows when we'll be fed again."

The three aliens picked cautiously at each dish, trying to keep from gagging as they swallowed some particularly obnoxious tidbit. After a few minutes Druit took a sip of the vodka.

"WOW!" he shouted, as he quivered a tentacle. "Mail from home! I guess booze is booze anywhere!"

As he joyfully raised the bottle to

his mouth again, Drul stopped him with a quick tentacle.

"Take it easy, Druit; we've got to keep our wits about us, save that stuff for later."

Even as he spoke, the Russians wheeled in a huge, new blackboard, and one of them began to sketch furiously. He drew a large circle which he labeled with the pictograph for "Earth." Then he sketched a finned cigar, which he evidently meant to portray a spaceship, about two feet from the Earth circle. He labeled the spaceship with the symbol that represented the three aliens. He drew a dotted line from the spaceship to Earth, and then redrew the spaceship, complete with the alien symbol, sitting atop the Earth circle. He chalked an arrow from the aliens' spaceship to a vacant space on the circle, about six inches to the right. At the point of the arrow he quickly drew another finned cigar, and labeled that one with the symbol for Earthmen. Then he drew a dotted line, which he started at the new "Earthmen" spaceship, and ran it till it went clear off the blackboard. With a great gesture he then lettered the pictographs that meant: "Earthmen, down"; "Aliens, up"; "Earthmen, up." The last two symbols he circled for emphasis. At that point he stood aside and looked questioningly at the aliens.

"I think he wants to know how to build a spacedrive," Druit said as he turned to his two companions. "Think we ought to tell him what we know?"

"I imagine you're right about the spacedrive part," Drul put his candied pear down as he spoke, "but I also think we should keep our big mouths shut till we can get together with the others—or at least until we can find out if the others are still alive."

He approached the blackboard, which one of the Russians quickly erased, and picked up a piece of chalk. First he drew the symbol that represented his group near one corner of the board; then he scattered four other similar symbols over the face of the blackboard. From each isolated symbol he drew an arrow to the center of the board. At the junction of all five arrows he put down the symbol that stood for the rendezvous point on the aliens' map. He then sketched the spaceship *around* the rendezvous symbol.

"There," he sighed with relief as he put down the chalk and returned to his companions, "I hope they understand from that that we have to join the rest of our crew at rendezvous point before we can give them the information they want for a spacedrive."

Actually the Russians had inferred from Drul's message that the aliens' spaceship had actually landed at rendezvous point. At any event the aliens got the desired result. The Russians became very grave as they

reached the conclusion that the Americans had the master share of the loot, as they had feared. One of them flipped a switch on an intercom and growled into the instrument.

"Instruct Ambassador Vladimir to start negotiations at once. Also alert the Ninth, Tenth, and Eleventh Bomber Wings as per plan G—in case the negotiations fail. We must get to those other aliens before it's too late!"

The President sat back comfortably in his tall leather chair. He smiled, his first smile in several days, as he examined the paper in his hand.

"We've won!" he chuckled triumphantly. "We bluffed them, Halwit. We bluffed them out!"

The secretary of state's mouth curled a little at the corners in a tired imitation of the President's grin.

"I truly hope so. They're so sly I sometimes wonder who wins when we cross diplomatic foils with them."

"Don't be so pessimistic, Halwit. We've had a couple of dark days lately, and now the sun is finally coming up. They're willing to negotiate about getting these alien groups together. That can only mean that they couldn't get the information they wanted from the aliens they had. Once we get all the groups together we'll see to it that they don't get that information."

"Are you sure we can do it," Halwit asked a bit cynically, "and still get the information we want?"

"Oh, I admit it will be tricky," the President understated with a laugh, "but it's worth a try. At least if we both get the same information, it will be a race to see who produces what first."

"And then?"

The President shrugged. "I'm very much afraid that my sense of prophecy doesn't stretch quite that far."

He put the paper down, studied it again for a moment, and then he asked Halwit:

"When is the first meeting set for?"

"They called me just before I came here." Halwit looked at his watch as he spoke. "Their aliens are being flown here now. We're to get together with them tonight at the U.N. Center as soon as they arrive. Our aliens are at the U.N. now. They have been questioned steadily by our scientists. As you know, they show a marked reluctance to release any real information until they're all together. Of course, the Russians don't know that, which is a definite point in our favor. The situation is critical all right, but I think we can handle it. At least if we can't, we'll find out soon enough."

The heavy Russian bomber dove with a roar at La Guardia field. The pilot gunned his engines and made an initial pass at the main runway, barely thirty feet off the ground, in a grand attempt to show off his

prowess as a pilot. He lifted it into an almost vertical climb at the end of the buzzing run, twisted into a tight left bank, and fishtailed down onto the runway against the wind.

The airport officials sighed in audible relief when he finally came to a halt at the far end of the runway and cut his engines. Even as the bomber's belly hatch swung open, a bulky army van quickly backed up to the plane with its rear doors open. Under cover of the dark night, and a cordon of M.P.'s, the aliens were swung out of the plane and into the truck in specially-built slings.

"Take it easy, knucklehead!" Cakna winced as he was bumped against the truck by an overanxious soldier.

"Relax, Cakna," Druit stretched his tentacles in relief after his confinement in the plane, "they don't understand a word you're saying."

"It seems to me they don't understand much of anything!" Cakna observed sourly. "Did you see the way that dim wit flew us in here? I could fly an engine crate better than that!"

"I'd venture to say that machine worship plays a large part in their religious make-up," Drul said. "They obviously believe that the machine will protect them no matter what they do. As a result, they show a marked disregard for their own safety whenever they operate a machine."

"It's beyond me how these characters ever developed any kind of

culture!" Cakna said as he rubbed at his bruise. "I'm no psychologist, but for my money they're all screwballs!"

The doors of the van were slammed shut and the truck started off with a squeal of tires. So quickly had the whole operation been performed that no one outside of those present were even aware that anything of importance had occurred. Less than ten minutes after the bomber had landed, the van was bouncing off over the field—giving the three aliens a few more reasons to find fault with the crudities of the civilization—behind its motorcycle escort.

The van threaded its way through the back streets of New York with its escort, in order to avoid the public gaze as much as possible. After an hour's travel it drove up an underground ramp in the U.N. Center at 49th Street, and pulled up to an unloading dock deep in the heart of the structure. The van doors opened and a squad of heavily armed soldiers stalked out, with rifles at port arms, to form an armed corridor down which the three aliens were wheeled in custom-built carts to the elevators. They were whisked upwards for several seconds, and then they were rolled out into a vast chamber. There were seats, vacant at the moment, built against the walls in the manner of a hospital observation hall for students. In the center of the room, like six medicine balls, sat the two "American" teams.

"There's the skipper!" Cakna shouted; his waving tentacles caused his military escort to point their rifles nervously at his middle.

The reunion of the nine aliens left the Earthmen openmouthed and staring. Their staccato chatter and entwining of tentacles suggested mutual suicide rather than greeting; but the soldiers had been warned to leave them alone as much as possible—unless they made an aggressive move towards one of the interviewing scientists.

"Jumping Jeleval! I never expected to see you boys again!" The captain whipped his tentacles around the heads of Drul and Druit in his joy.

The three newcomers leaped off their carts and ran about the room throwing their tentacles around the heads of the other six, shouting greetings at the same time. After the first wild jubilation of their reunion died down, Cakna asked: "What about the others, the other two teams. Any word?"

The group fell silent for a moment.

"Nothing." The captain blinked his huge eyes in a sign of remorse. "I'm afraid they're dead. It seems that you boys were the only other group found, aside from us. Of course there's always a chance, but I wouldn't bear any false hopes. This whole planet was alerted when we were found. I'm sure that some word of the others would have been sent here by now if they had

been seen. So far there has been nothing."

After another silent moment Drul changed the subject with:

"What do you think of our chances, sir? These things don't strike me as being the most rational creatures I've ever seen."

"I say they're barbarians," Cakna stated flatly.

"Then where did they get a seventh-level culture from?" The captain sat as he spoke, and motioned the others to do the same.

"Perhaps they are degenerating mentally, due to some cosmic radiation," Cakna said. "I noticed a strong sunspot activity on this planet's mother star."

"Perhaps," the captain chuckled, "but I rather doubt it. No, this planet's disease is more complicated than that. Babla and I have been going over the evidence we've been able to glean from these interviews, and I think we've hit upon a workable theory. Maybe you three can add to it."

The nine aliens rolled themselves into a small circle and prepared to listen.

"The way Babla and I see it," the captain resumed, "the creatures on this planet are scientifically and mentally advanced enough—their science and architecture speak for themselves. They do, however, show a marked retardation in their emotional make-up. They demonstrate the remarkable paradox of being gregarious by nature, and, at the same time, finding it emotionally impossible to live together. Why? The reason escaped us for a while until one of their interviewing scientists gave us a clue.

"He said that we were the first things, outside of meteorites, ever to come to them from outer space. *That* was the answer. Every other civilization we have ever come across, our own included, always had the same thing in common—no matter how they varied in other aspects. Periodically, from their earliest days, they had been contacted by some outside enemy. You are all acquainted with the common varieties of space plagues: the bacterial clouds and space lice that travel in swarms through the interplanetary voids. The planets' civilizations were forced to unify against the common enemy that threatened them all. This planet, being so far removed from the regular routes of the space vermin, has never been faced with an outside enemy. As a consequence, they have never unified.

"Naturally, while their science progressed, their emotional sense of interreliance deteriorated, till today they have degenerated into quibbling, neurotic groups. Instead of trying to unite, and resolve their common problems, they compete with each other—in order to protect themselves, from themselves."

"I think you've hit it, captain." Drul twitched a tentacle in agreement. "I'd say your theory is sound, but what can we do about helping them? Even more important than that, what can we do about helping ourselves? I hardly feel that our position is exactly rosy."

"I believe," the captain looked about him significantly, "we can solve both of those problems at the same time."

The U.N. Scientific Committee, which had been appointed to question the aliens, sat in closed conference. They had been bickering for hours as to the procedure to be followed during the questioning. Each scientist was eager to ask questions only about those fields in which he personally was interested. To boot, the Americans were trying desperately to steer the questions away from those dealing with the aliens' spacedrive and weapons. The Russians, of course, were pressing just as desperately to have those questions asked first. The issue, which threatened to resolve itself in a fist fight, was finally settled by the Chilean scientists, with the suggestion that the first questions deal with the history of the aliens' trip, with emphasis on their reasons for coming to Earth.

With the problem of the first questions settled, the scientists filed into the examination room. The interview started immediately. As every question and answer had to be transposed through several stages of blackboard symbols and sign language, the progress of the exam was agonizingly slow.

Several hours after the start of the interrogation a white-faced professor dashed out of the hall with a sweat soiled notebook in his hand. He shoved the pad at the girl typist, who had been stationed at the door of the hall since the examination had begun.

"Have a copy of this sent to every member of the Security Council as quickly as possible!" he gasped. "It is of the utmost importance that we get action on this at once!"

The girl propped up the pad, quickly slipped a stencil sheet into her typewriter, typed the official heading and routine information at the top, glanced at the first page of the pad and began to pound furiously:

Gentlemen:

Following is a condensed and anglicized version of the interview of the nine extraterrestrial aliens held under United Nations supervision. It is the opinion of the interviewers that this information is of vital importance to the security of Earth. We therefore suggest an immediate meeting of the Security Council in order to determine a proper course of action.

Note:
All Alien answers were given by one individual who appeared to be the leader of the group.

Q. Where are you from?
A. The Great and All Powerful Empire of the Universe.
Q. I mean, where are you from specifically, what planet or star?
A. We are from everywhere. We fill the Universe.
Q. Where did you take off from?
A. I cannot give you that information.
Q. Why can't you? We have no way of reaching your world.
A. I cannot be sure of that until you have been thoroughly investigated.
Q. By you?
A. No.
Q. By others of your kind?
A. Yes.
Q. When will they arrive?
A. Soon.
Q. Why did you come?
A. To discover if you are ready for the Test.
Q. What sort of test?
A. To see if you are fit to join the Empire.
Q. What does this test consist of?
A. You will be exposed to a weapon of a basic nuclear fission design. If you can nullify the effects of this weapon, then you will have proved that your science is advanced enough to enter into the Universal Alliance, which is the Empire.
Q. What if we cannot nullify the effects of this weapon?
A. Then you will be destroyed by it.
Q. Can we refuse to take the test?
A. Yes, in that case you shall be isolated from the rest of the Universe as a subnormal planet.
Q. Just what will this isolation mean to us?
A. We will supervise your science and culture until you will be able to pass the Test.
Q. Does that mean that you will give us the benefits of your advanced science?
A. Yes.
Q. Will we be required to pay for this service?
A. Yes, we have a vast empire and, as a consequence, vast expenses. Each student planet is expected to pay its own way.
Q. What are we to use as payment? We have no common medium of exchange.
A. On the contrary, you can reimburse us with an abundance of a very valuable commodity.
Q. What is that?
A. Expendable labor units. You will provide us with several million slaves.

Nobody knew how the story had leaked out. Perhaps one of the U.N. scientists had talked indiscreetly; or it could have been that the columnist who had released it had contacts in higher places than people had imagined. Whatever the reason, the story was spread over the face of every newspaper in the world within three days: ALIENS DEMAND SLAVES. They screamed to a frightened world population: SLAVES OR DIE, ALIENS SAY.

Since newspapers invariably distort the facts for a cryptic headline, a world-wide panic almost ensued. Several bloody riots burst forth, particularly in those countries where slavery, or near slavery, was common. The people there knew what to fear. It was bad enough on Earth, but to be surrendered to the whims of alien slave masters was too much to bear. The situation was rapidly becoming dangerous.

Politburo Chairman Torsky stood stiffly on the balcony. His hands patted each other impatiently behind his back as he looked down at the mob milling in the street below. Several people lay unconscious or dead among the rioters, victims of frantic police action. Torsky finally snorted angrily, turned and stamped into the room.

"Stupid sheep!" he bellowed at the uneasy government officials gathered there. "They will turn Moscow into a shambles!"

"They are frightened, sir," an aide said timidly.

"Frightened of what!" Torsky roared at the unfortunate man. "Of nine animated circus balloons? Do they think we'd trade them off as slaves? We have enough labor battalions in Siberia to supply the aliens for a century!"

"Yes, your excellency," the Propaganda Minister smiled apologetically, "but we've been keeping those labor battalions a secret from the public. As the leader himself pointed out, it would not be wise for the people to know just how many of them do . . . uh . . . become wards of the State. As far as those comrades outside are concerned, I'm afraid that they show a startling lack of confidence in the ability of their government to protect them. They feel that they will be the first to be sent to the aliens."

"Perhaps," Torsky sneered, "your propaganda is not as effective as your reports would have us believe."

The Propaganda Minister coughed nervously and hurriedly returned to an examination of his portfolio.

"Has that scientist Chilko come yet?" Torsky bellowed at his secretary as he paced the room.

"Yes, your excellency, he arrived a moment ago. Shall I have him sent in?"

"Yes, yes, send him in at once!" Torsky sat down heavily behind his huge desk.

The scientist Chilko was a thin, bespectacled man. His slouch and red-rimmed eyes bespoke the killing hours of labor he had just finished. He bowed slightly to the group in the room.

"Well, what have you found out?" Torsky thumped his desk impatiently. "Can we do it?"

Chilko removed his glasses slowly and stood there for a moment as if afraid to speak; finally he straightened

a bit and said, "I am truly sorry, your excellency, but we cannot do it. So far we have found no way at all to nullify the effects of atomic fission."

"What!" Torsky roared. "What are we paying you for? What did you get all those medals for? You're a traitor to your country!"

An uneasy silence filled the room while Torsky fumed. Chilko grew red as the chairman called him every degrading name in his repertoire. Finally he quieted down, stared at Chilko for a while, and asked, in an oddly restrained voice:

"Is there no chance Chilko? Haven't you come across anything?"

"As a matter of fact, your excellency," Chilko answered, "we do have a theory of reducing nuclear fission temperature, but I'm afraid that we are not far enough along in our research to effectively corroborate it. If, however, we can enlist the aid of another scientist, perhaps—"

"Who is the man you want?" Torsky sat up quickly. "You shall have him immediately."

"He is an American, named Hartnell, your excellency. Perhaps you have heard of him, he is a very famous nuclear physicist. I am certain that with him we might be able to—"

"Are you out of your mind, Chilko?" Torsky twisted irritably in his chair. "That is out of the question."

"Then I'm afraid that there is truly no hope at all, your excellency."

As Chilko turned to leave, Torsky waved a restraining hand at him.

"Wait a moment, Chilko, where in America can we get in touch with this scientist?" Torsky pinched the bridge of his nose and sighed as the tension of the past few days began to tell on him. "Perhaps our ambassador in Washington will be able to do something for you, through the United States Government."

The secretary of state handed the message to Balfort, the head of the secret service, and waited for the reaction.

"Well, I'll be damned!" he muttered through a broad smile. "The Reds are offering their co-operation on this bomb nullifier project. I never thought they'd ever co-operate in anything."

"Think we can risk it?" Halwit asked anxiously.

Balfort looked through the thick smoke of his cigar and shook his head as he spoke.

"I don't know now, there's no doubt they're a slippery bunch. Did you ask Hartnell about our side of it?"

"I called him an hour ago," Halwit said. "He told me we're still stymied on the nullifier project. He also said that he would be very happy to confer with Chilko. Claims he met Chilko back in the '20s and rated him a top man in the field. He's all for the idea."

"Those intellects never are much

on politics," Balfort grunted as he rubbed his chin in thought. "Personally, I say no deal. We have too much to lose. We're way ahead of them in atomics, and I'll just bet that those Reds would love to get a peek at the insides of our labs."

"Beware the Greeks bearing gifts," Halwit quoted.

"Exactly," Balfort agreed. "I say, wait it out. If our lab boys can't lick it, no one can."

As the days passed, the situation worsened. Communiques from the aliens revealed that their group of testers would arrive any day. The moment of decision was coming closer. The world had to choose between annihilation or slavery. The temper of the public was ugly. It had slowly switched from fear to anger. The populaces of the world were demanding co-operation on the part of their governments in order to reach some sort of common decision. The U.N., as usual, was deadlocked, since its two most important members refused to agree on a policy. The Russians screamed that the United States was ready to sacrifice the world because they refused to co-operate on the nullifier. The United States claimed that the Russians were only after more atomic information to further their own cause. It was Hartnell, the physicist, who finally broke the deadlock. He went to see the President.

The President was not happy. He frowned at his clasped hands and silently cursed the day he was nominated at the National Convention. Professor Hartnell sat facing the President's desk.

"That is the story in brief, sir," he said. "There is no sense in deluding ourselves about the future. We have reached an impasse. We've spent so much time increasing the destructivness of the bombs, we find it difficult to think in terms of nullifying them."

"Be that as it may," the President said, "but I still cannot see why you insist on Chilko. You must realize that reversing our policy like that will prove very embarrassing."

Hartnell shrugged. "If we are to get anywhere at all on this thing, we need some fresh thinking. We must have every qualified nuclear fission man in the world on this project, and, government policy not withstanding, that means Chilko." The professor examined his nails as he paused. "Of course, if the President prefers to prepare slave lists instead—"

The President winced involuntarily. "All right, professor, you win—but I wonder how kindly the history books will treat me for this one."

The Hartnell-Chilko theory of anti-fission fields was born three weeks later. Scientists of a dozen different nationalities worked on it desperately, day and night, until the problem was finally cracked. But the aliens threw a monkey wrench into the works at

the last moment.

Hartnell slammed his desk phone down viciously and leaped to his feet.

"This is impossible!" he fumed at Chilko. "We could never build the nullifier in that short a time."

"But the aliens claim that their testing group will arrive next week," the Russian said. "What can we do? All we have is an untested theory. We need time to build the machine."

Hartnell slapped the desk hard and shouted, "We *will* get the time. We shall go to see the aliens this very minute. Surely if we show them that we already have the theory, which I'm sure is correct, and that we need only the time to apply its principles mechanically, they will grant us the stay. At any rate, it is certainly worth a try!"

He snatched up his phone and quickly dialed the U.N. laboratory where the aliens were being kept.

"Hello, this is Hartnell speaking. I want to arrange an immediate interview with the aliens . . . That is right, slates and all . . . We will be there in half an hour."

When Hartnell and Chilko arrived at the interrogation hall with their portfolios, everything was ready for the interview. By this time the problem of communication with the aliens had been much simplified. A very efficient pictograph system had been worked out that allowed the interview to progress almost as quickly as if both groups could actually speak to each other. The alien captain and his crew sat on one side of a conference table on low stools. The two Earth scientists sat opposite them. Hartnell and the captain both used large slates upon which they wrote their pictographs. Hartnell wrote first.

"We wish to delay the test."

"I do not know if we can do that," the captain wrote. "We work on a close schedule, there are several other planets waiting for our examiners."

"We have good reason for our request," Hartnell's chalk flew over his slate. "We already have the theory of nuclear fission nullification. We need only the time to build and test the machinery necessary to do the work."

"Can you prove what you say?" the captain asked.

In answer Hartnell handed him a sheaf of his notes, hastily written in pictographs. The captain examined them for a moment, and then handed them to the other aliens. They chattered together for a while, and then the captain wrote:

"Your theory is correct. I believe that we can grant you a stay on the strength of it."

Hartnell and Chilko sat back and broke into wide grins.

"However, there are a few complications," the captain continued.

The scientists sat forward again.

"In order to delay the Test we must contact our central office. As you know, our spaceship has been

unfortunately destroyed. We have no way of communicating with the proper authorities."

"Can't we help you?" Hartnell asked. "I am sure that we could build a transmitter for you, if you would but give us enough information to do so."

The captain did not answer immediately; instead he conferred with his crew again for several minutes. Finally he wrote:

"We have decided that, since your case is unique in the point that we accidentally lost our means of communications—for which you cannot be blamed—we would not be committing a breach of regulations in giving you enough information to build the necessary transmitter."

Within five days, ten of the best electronics men available had assembled the aliens' transmitter from schematics drawn for them by the captain. It was not a particularly large affair, being small enough to fit inside an army radar van. It did require, however, almost the entire output of the U.N.'s power plant to run it.

Newspapers and radios blared forth the joyous news of the reprieve. There were celebrations throughout the world, the like of which had not been seen since VJ day. Whistles blew and people danced in the streets. When the day arrived for the aliens to send their message, a million people jammed the mall in front of the U.N. building. The transmitter's radar van had been parked in front of a reviewing stand that held dozens of internationally famous men. The aliens themselves were grouped around the transmitter's control rack that was mounted at the rear of the truck. They were being photographed by forests of cameras and televised to millions of people as they prepared to contact their world. Amika, the radio operator, checked the transmitter thoroughly.

"Not a bad job," he reported to the captain. "It should work fine. What do you want me to send, sir?"

The captain handed him a slip of paper. Amika read it and reached for the transmitter key.

As Amika tapped out the interstellar code, the first officer turned to the captain and asked: "Do you think they'll come for us, sir?"

"I'm certain of it," the captain reassured him. "Once they pick up that code the Guard ships will be here as fast as their overdrives will allow."

The first officer looked out at the whirring cameras and the pushing crowds.

"Will we ever return, sir?"

The captain turned his head to the crowd. "Oh, I don't know. I gave them a two-year reprieve. It might be fun, at that, to come back and see how our little experiment in world nationalization worked out. At any rate, I'm certain that our Trade Commission will be interested in that

nullifier thing of theirs. It looks as if it might work at that."

Twenty light-years across the galaxy an alien substation operator stretched his tentacles in weariness as he sat before his quiet equipment. Suddenly a red light flashed as a multiple light speed beam flashed an S.O.S. into the receiver. A recorder started immediately and an audio converter changed the signals into words.

"Disabled ship. Disabled ship," the speaker blared. The operator swiveled in his chair and listened intently. "This is Flight 425 out of Central calling. I repeat, Flight 425 out of Central. Requesting immediate assistance. Disabled in a fuel explosion at 0745 T.U. on the 13th day of Jeleval. Drifted off course into the general area of Sector III. Suffered seventy per cent casualties in the explosion and bailed out. Have been stranded among an aberrated civilization for several time-periods. Were forced to fabricate a story about a Galactic Empire and an Atomic Test in order to trick them into building a transmitter for us. This is the first opportunity we have had to communicate. Will leave transmitter keyed in to act as homing beam for you. Please send aid immediately. The chow here is awful.

Captain Jula of Nark,
Commanding."

The operator removed the recording cube from its machine and placed it in the relay slot that fed to Galactic Guard headquarters. As he pushed the button that activated the relay transmitter he smiled an alien smile.

"Those Guard boys," he muttered to himself, "trust them to get their hides out of a pickle."

THE END.

IN TIMES TO COME

"The Fighting Philosopher," by Everett Cole, heads next month's list. Cole's done a number of yarns based on the Philosophical Corps; this story, chronologically, should precede all the rest—it's the story of how the Corps came to be established. How do you go about convincing a government that a Philosopher is, actually, the most potent Fighter of 'em all?

Alexander of Macedon, trained by Aristotle, might have explained!

THE EDITOR.

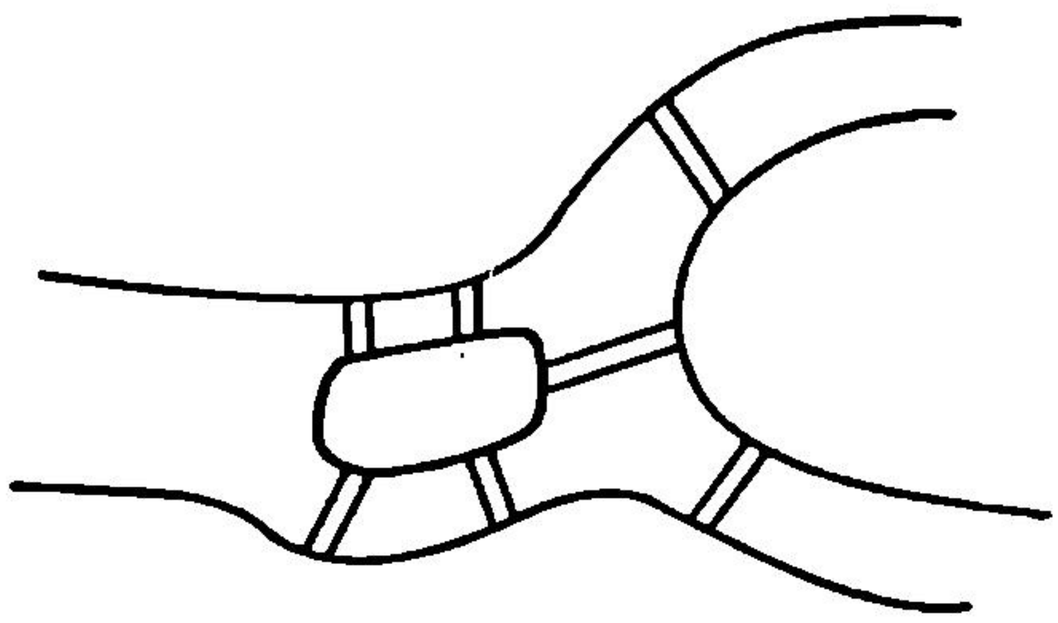
TOPOLOGY

***Wherein** it is shown that an egg is really the same thing as a drinking glass, while a beer mug is not at all like a drinking glass, but really resembles a doughnut or a water pipe!*

BY J. G. HOCKING

Some time ago this magazine carried a story concerning the topology of the Boston subway system. The germ of the idea was that after adding a new shuttle link, the connectivity of the system became infinite. Trains then vanished and re-appeared, creating much havoc and a very amusing yarn. But with all due apologies to Bill Deutsch, the author, it simply could not happen!

Over a period of years during which ASTOUNDING and I grew up together, I have read some very clever stories built upon the fascinating properties of the Moebius strip, the Klein bottle and other geometric figures which interest the topologist. In fact, such a story appearing, I believe, in 1939 influenced my changing from chemistry to mathematics in college. Another source of topological information is found in some scattered popular articles of which the two listed in the references are perhaps the best. While much can be learned from these stories and recreational articles, it is my conviction that a more rigorous presentation of topology is possible, particularly to ASTOUNDING readers. This article is designed to do the job; I hope it succeeds even in part.

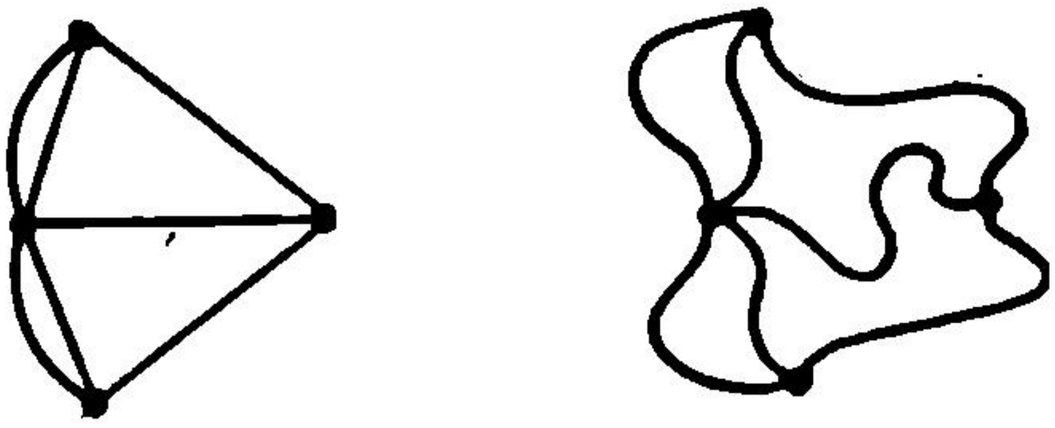


KOENIGSBERG BRIDGES

DIAGRAM I

For a start and before even defining topology, let us look for a while at the theory of linear graphs and show

where Mr. Deutsch was wrong. The first linear graph to be analyzed as such was the famous Koenigsberg bridge problem. The city of Koenigsberg in old Germany was built at the confluence of two streams and centered on an island in the main stream. Bridges connected the various shores as shown schematically in diagram 1. The problem was to walk across each bridge once and only once in a single stroll. The great mathematician Euler

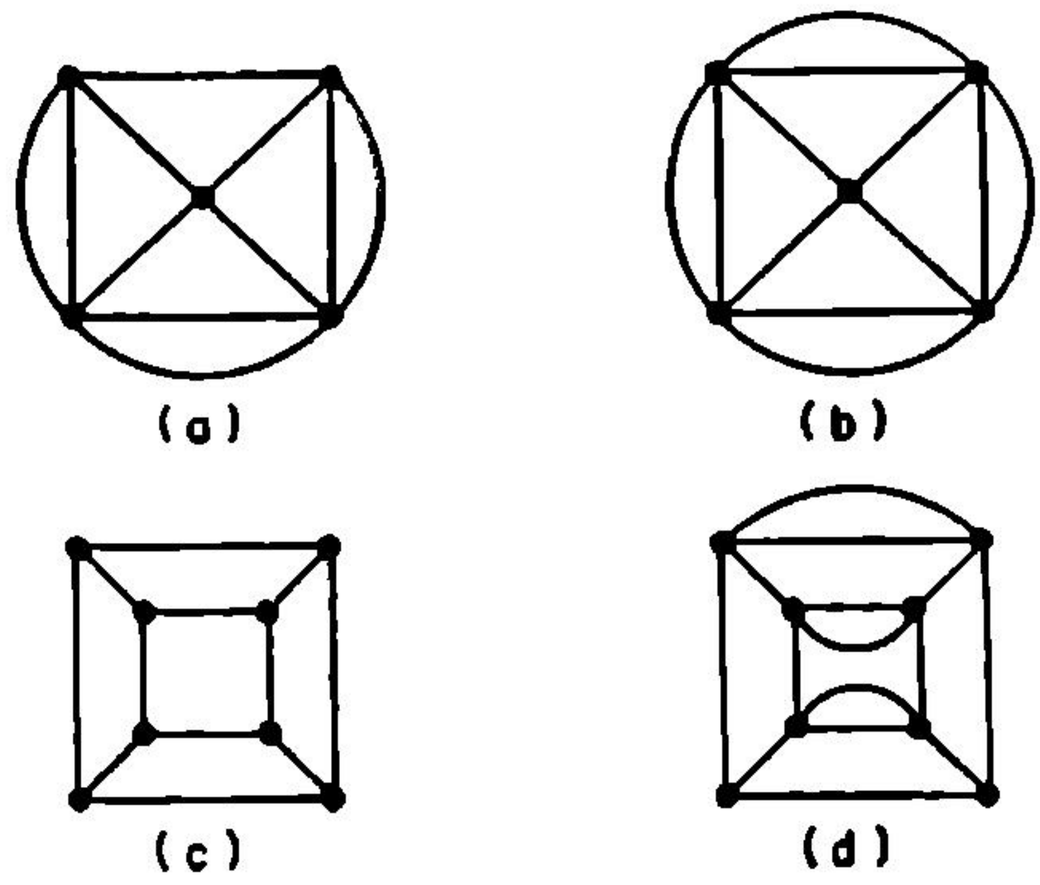


TWO FIGURES EQUIVALENT TO THE BRIDGE PROBLEM

DIAGRAM 2

noticed that this problem is equivalent to drawing the figures in diagram 2 in one continuous stroke without retracing a line. Notice that lengths, angles, areas, et cetera play no role at all in the problem, i.e. although the problem is geometric, it doesn't seem to concern the usual geometric properties.

Euler easily showed that a solution of this problem is impossible and then went on to find a complete criterion for deciding when any such figure can, or cannot, be drawn as required. For example, can we draw the figures in diagram 3 in one continuous stroke without re-tracing a line? Well, figures



CAN YOU DRAW THESE WITHOUT LIFTING THE PENCIL OR RETRACING ?

DIAGRAM 3

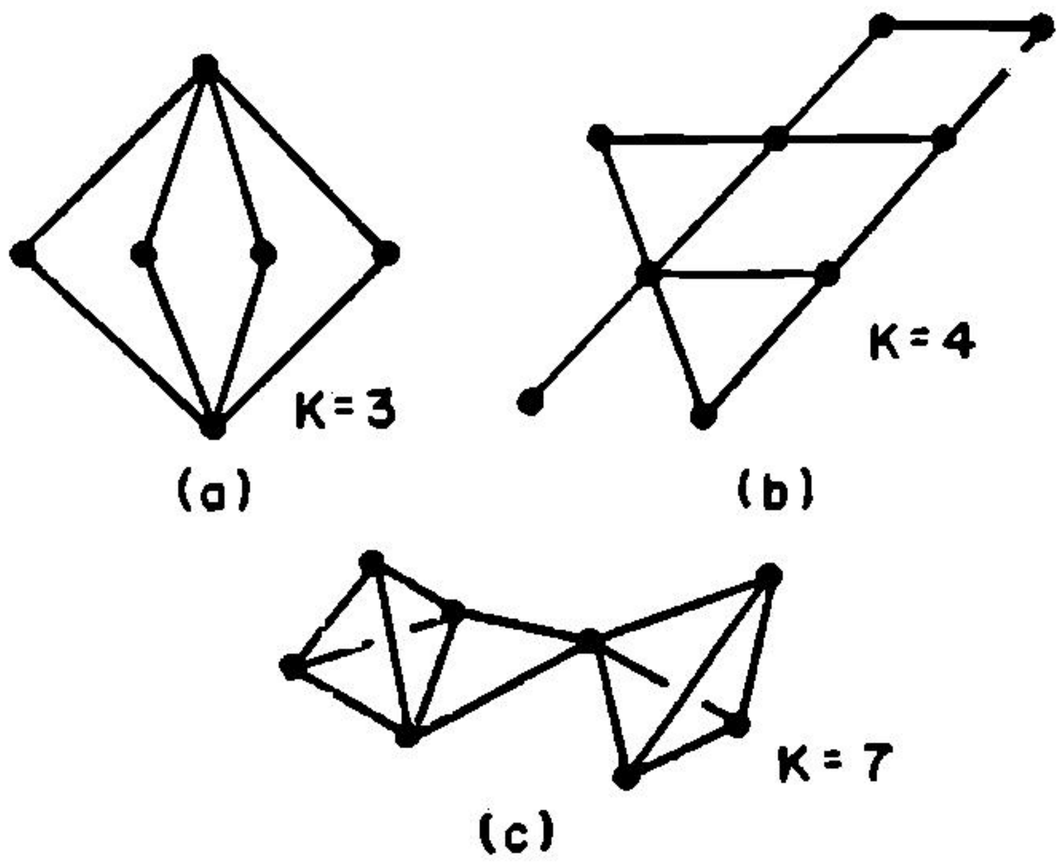
(a) and (d) can be, and figures (b) and (c) cannot be, so drawn. The decision method is quite simple and, incidentally, has been the means of winning several bar bets. (Already we see that topology has more than just a theoretical value.)

Method: Count the number of lines emanating from each vertex. If this number is odd, call the vertex odd; if this number is even, call the vertex even. Then the figure may be drawn as required if and only if there are at most two odd vertices in the figure.

That is all there is to it, that is, if we are satisfied with just knowing whether or not a given figure can be drawn, then this criterion is complete. If we actually want to draw the figure, a further application of Euler's argument shows that we must start at one of the odd vertices—if there are no odd vertices, start anywhere—

and then must finish at the other odd vertex. I speak of the *other* odd vertex here because odd vertices in any linear graph must occur in pairs, i.e. the number of odd vertices in a linear graph is necessarily even. With these criteria, it is easy to cook up some fancy parlor tricks.

Before going on, we had better say just what is meant by a linear graph. For a definition, we may think of a graph as a system of points (vertices) and arcs joining these points. The figure may be in either two or three dimensions. For example, figures (a) and (b) in diagram 4 below are planar graphs while (c) is supposed to be in



SOME LINEAR GRAPHS
DIAGRAM 4

three dimensions. While such simple graphs as those pictured are fairly easy to analyze, we should not be misled into thinking that the study of linear graphs is trivial. In fact, much remains unknown, even about such a simple graph as a knot, about which more will be said. But first, in order to refute the subway story of Mr. Deutsch, let us examine briefly the concept of connectivity of a linear graph.

As usually defined, the connectivity of a linear graph is the maximum number of independent simple loops in the graph, or, equivalently, the number of arcs which must be removed so that the resulting graph has no loops at all. Now if a graph has k arcs and q vertices, the connectivity K is given by the simple formula $K = k - q + 1$. For examples, see diagram 4. Thus it is obvious that any finite graph cannot possibly have infinite connectivity and a subway system is necessarily a finite graph!

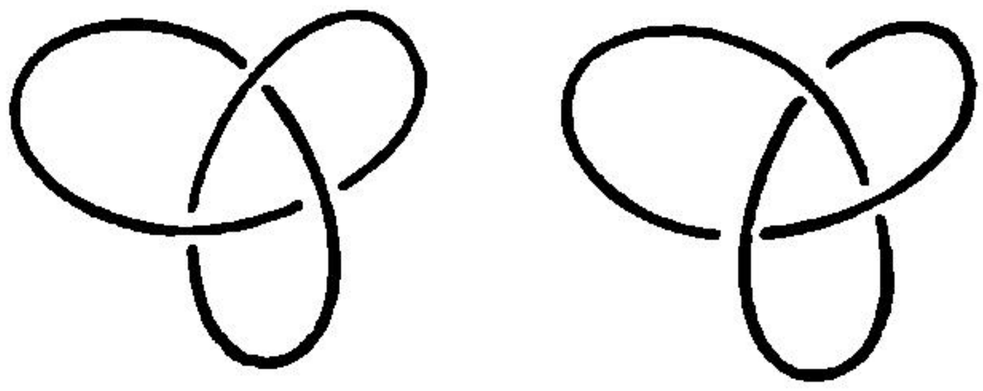
While the theory of linear graphs will not enable us to find lost subway trains, it does have very definite applications. The most evident of these is to electric circuits which are linear graphs almost by definition. At least two famous physicists, Kirchoff and Maxwell, developed and applied some of the theory. Presently, some analysis of circuit by-passes is undertaken at the design stage by means of graph theory. Another less obvious application is now being made at the University of Michigan where intensive research on group dynamics is underway. Here the vertices of the linear graph are taken to be individuals and the arcs represent communication between them. That is, if Joe talks with Mike, a line joins them; if they do not communicate, then no line. The

problem here is to analyze communication, usually within a specific working group, in order to minimize duplication of effort, clarify chains of command, et cetera.

To return to extremely simple graphs and to a very difficult problem, I want to mention the theory of knots and braids. Since both objects are familiar to everyone, the question might arise, "What's to know?" Well, the general problem is to give criteria to determine when two knots —or braids—are equivalent in the sense that one can be deformed by twisting, et cetera, into the other. The question was completely answered for braids by Professor E. Artin of Princeton University but the same question for knots has not been answered and, although under attack, probably will not be answered for a long time.

A knot is formed for our purposes by cutting a circle, tying a knot and then joining the cut ends back together. So as a linear graph—just insert two vertices anywhere on the knot—a knot is very simple, having connectivity K = 1. But even simple things are not known about knots. For example, experiments with string shows that it seems to be impossible to tie two knots which will cancel each other if moved along the string. There is no mathematical proof of this, as far as I know. The question of equivalence mentioned above is even more difficult.

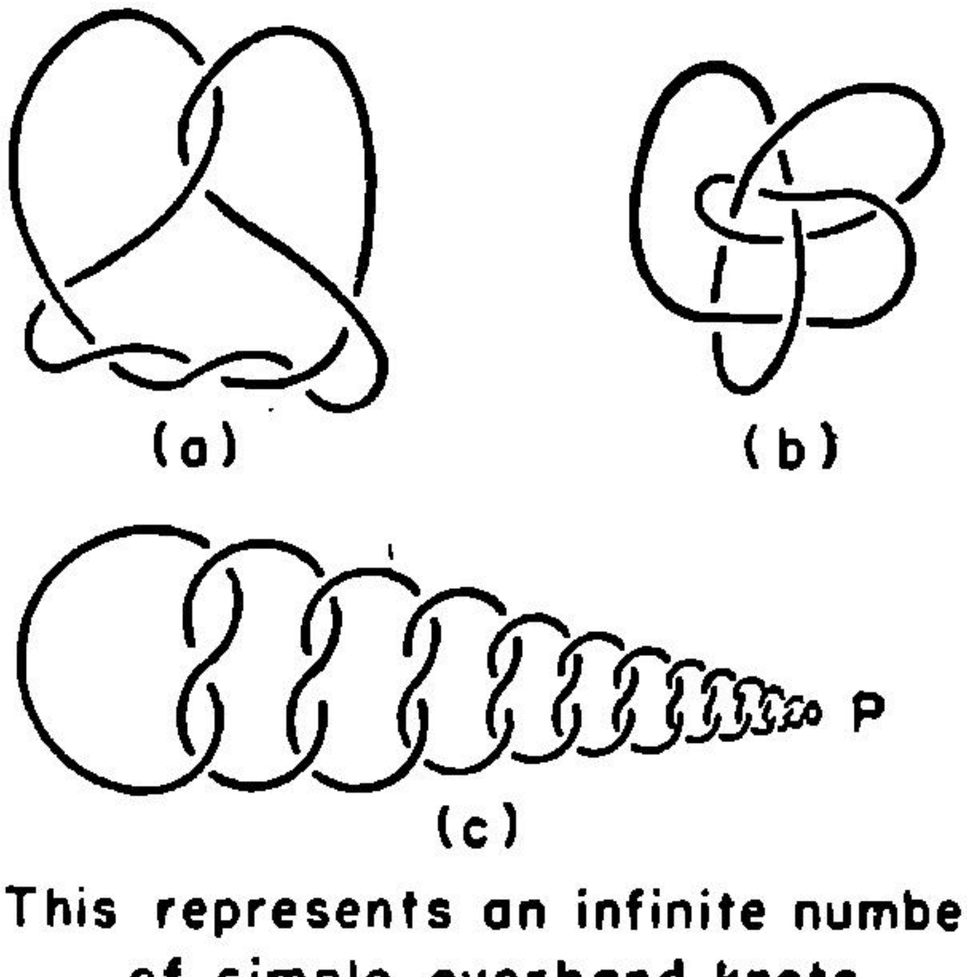
As an example of two non-equivalent knots, study diagram 5. When two such very similar objects are not equivalent, think of the difficulty in-



RIGHT AND LEFT TREFOIL KNOTS

DIAGRAM 5

volved in discussing a really complicated knot such as a knitted sweater (or is it a braid?). A few more knots are shown in diagram 6 with figure (c) being rather complicated. I mention knot theory to show that even one-dimensional configurations are not completely classified. As we might ex-



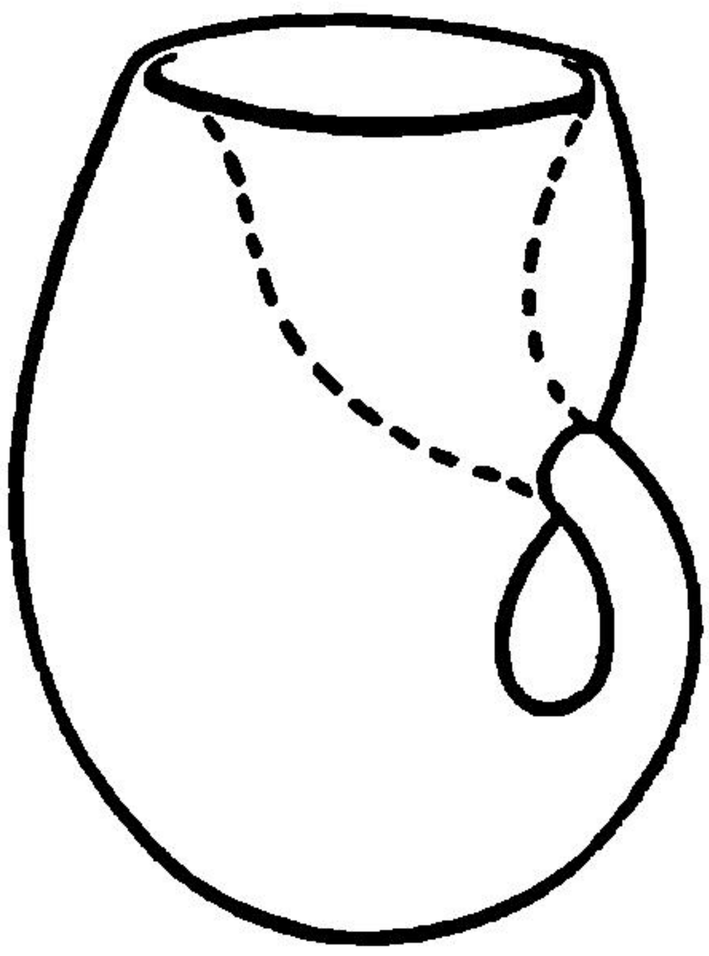
KNOTS

DIAGRAM 6

Note: Examples (a) and (b) are due to Reidemeister and example (c) to Artin and Fox

pect, the degree of difficulty increases with higher dimensions, and it seems to increase at least exponentially!

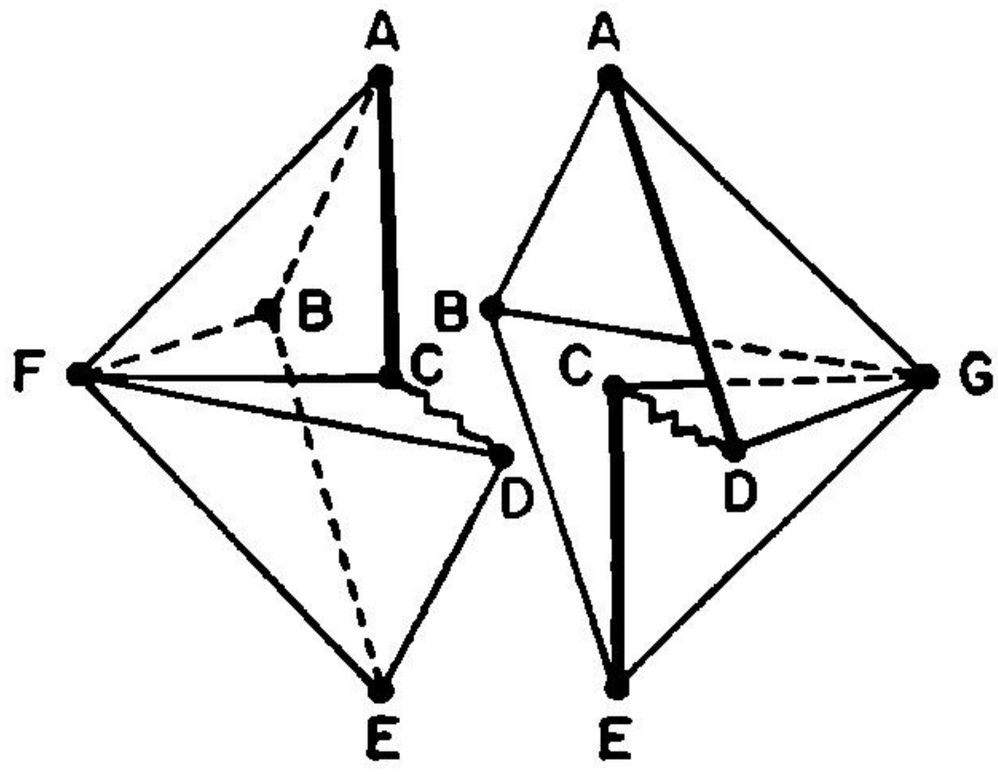
Being quite fearless, however, let us plunge into the next higher dimension and look at some surfaces. These can be very nasty in general but if we stick to simple types, we can discuss a theory. Perhaps every reader of science fiction is acquainted with the Moebius strip and the Klein bottle. Although the true Klein bottle cannot be constructed in three-dimensional space, diagram 7 illustrates a simplified version in three dimensions.



KLEIN BOTTLE

DIAGRAM 7

A less well-known figure is pictured in diagram 8. It is easily made and if we examine it carefully, it turns out to be—a Moebius strip! Notice it is composed of six equilateral triangles, one large and two smaller isoceles right triangles. The vertices are those



A POLYHEDRAL MOEBIUS STRIP

(Figure cut for clority)

DIAGRAM 8

of a regular octohedron together with its centroid. As pictured, the jagged line indicates a tear across the large right triangle and the heavy line is the edge of the finished figure.

Both the Moebius strip and the Klein bottle are examples of non-oriented, or unilateral, or one-sided surfaces. If we consider for the moment only oriented surfaces, and in particular only those surfaces having no boundary edge, there is a complete classification by means of *genus*. This concept is explained in diagram 9 by

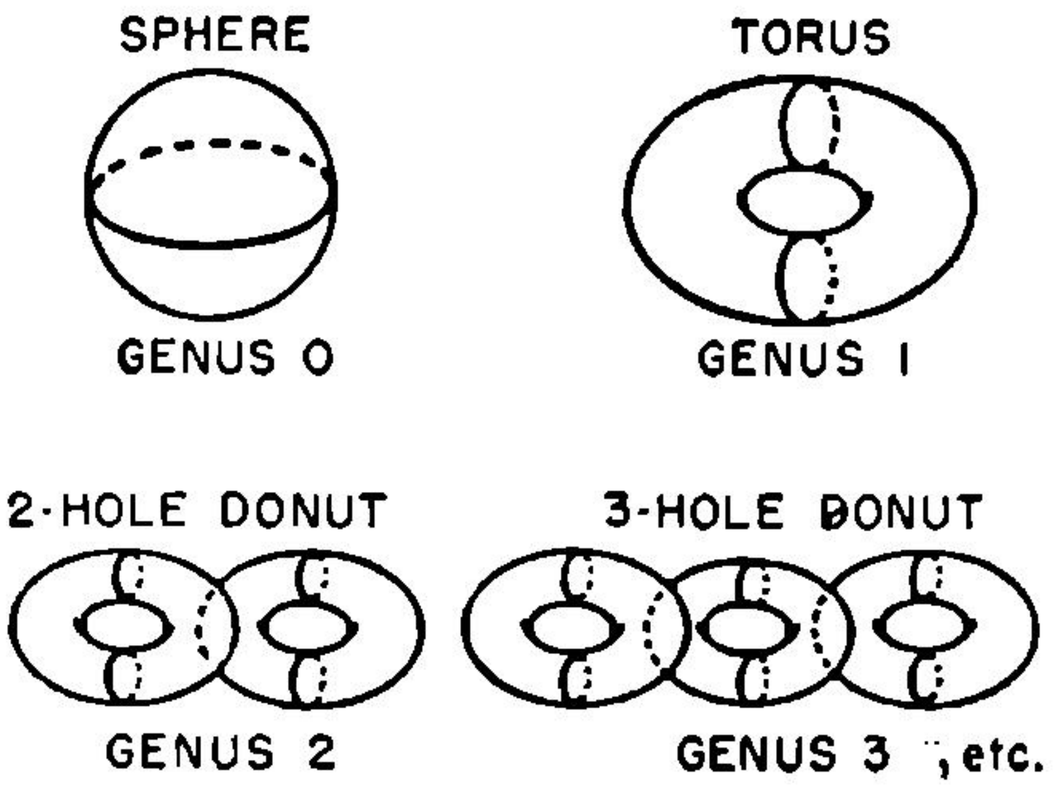
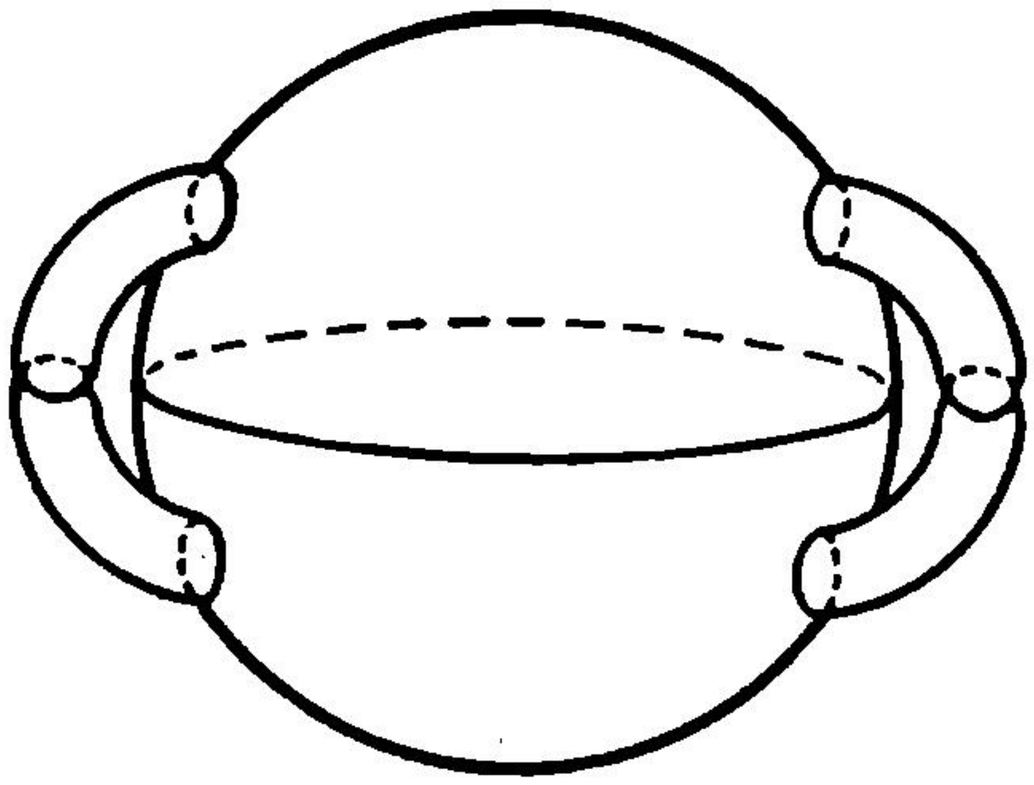


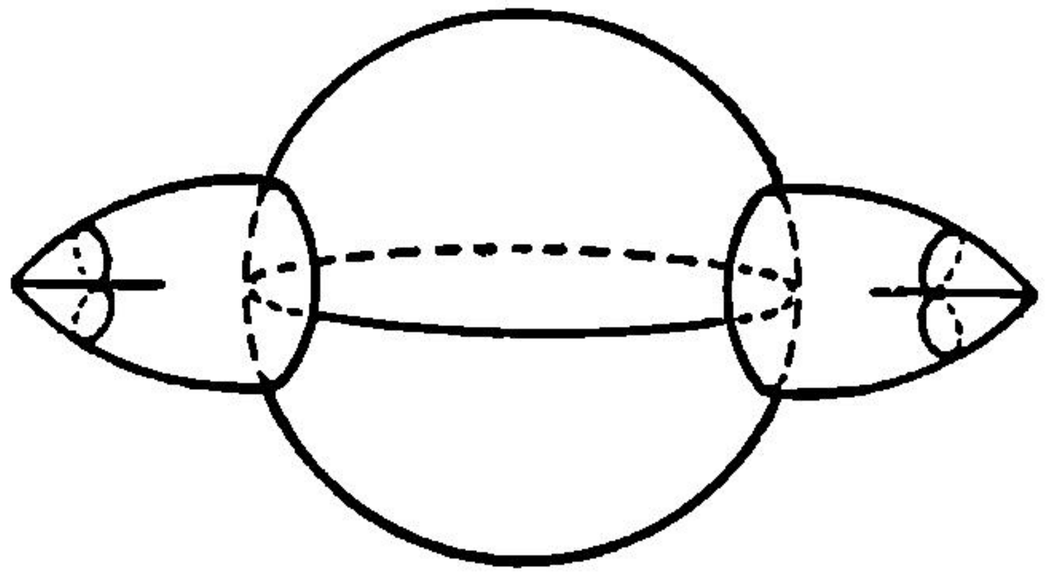
DIAGRAM 9

means of examples. Each of these figures is topologically equivalent to a sphere with the proper number of "handles" attached as in diagram 10.

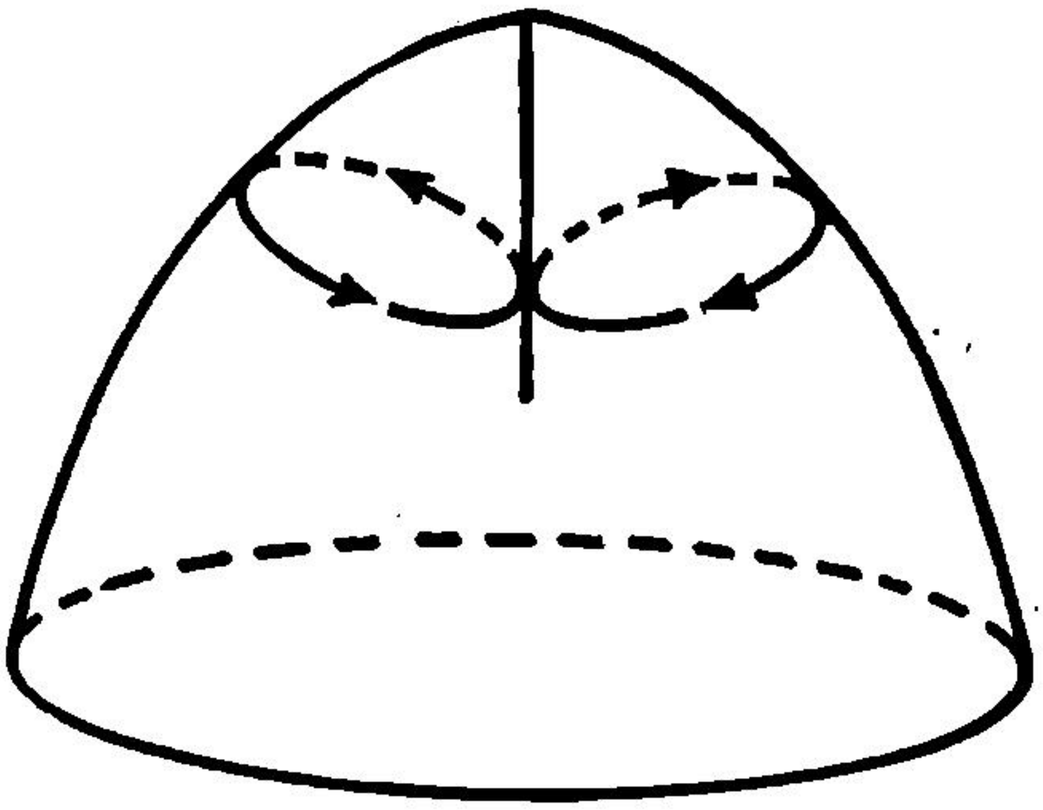


GENUS 2
DIAGRAM 10

A basic non-orientable surface is the cross-cap, which can be obtained from an ordinary Moebius strip by deforming it so as to make the edge into a plane circle (diagram 11). This can only be done in imagination, however, since the surface intersects itself. With this as a tool, we can also classify all non-orientable surfaces without edges. Each such surface is topologically equivalent to a sphere with the appropriate number of disks removed and replaced by cross-caps. Thus diagram 12 is actually a Klein bottle!



KLEIN BOTTLE
DIAGRAM 12



CROSS-CAP
DIAGRAM 11

We have seen that the simpler two-dimensional surfaces are almost completely classified but the same is *not* true of simple three-dimensional figures. In fact, a complete characterization even of Euclidean three-space in terms of purely topological properties has yet to be made. Either this problem is very difficult or we need some as-yet-undiscovered topological properties. But we have talked *about* topology for a long while and have yet to define the subject!

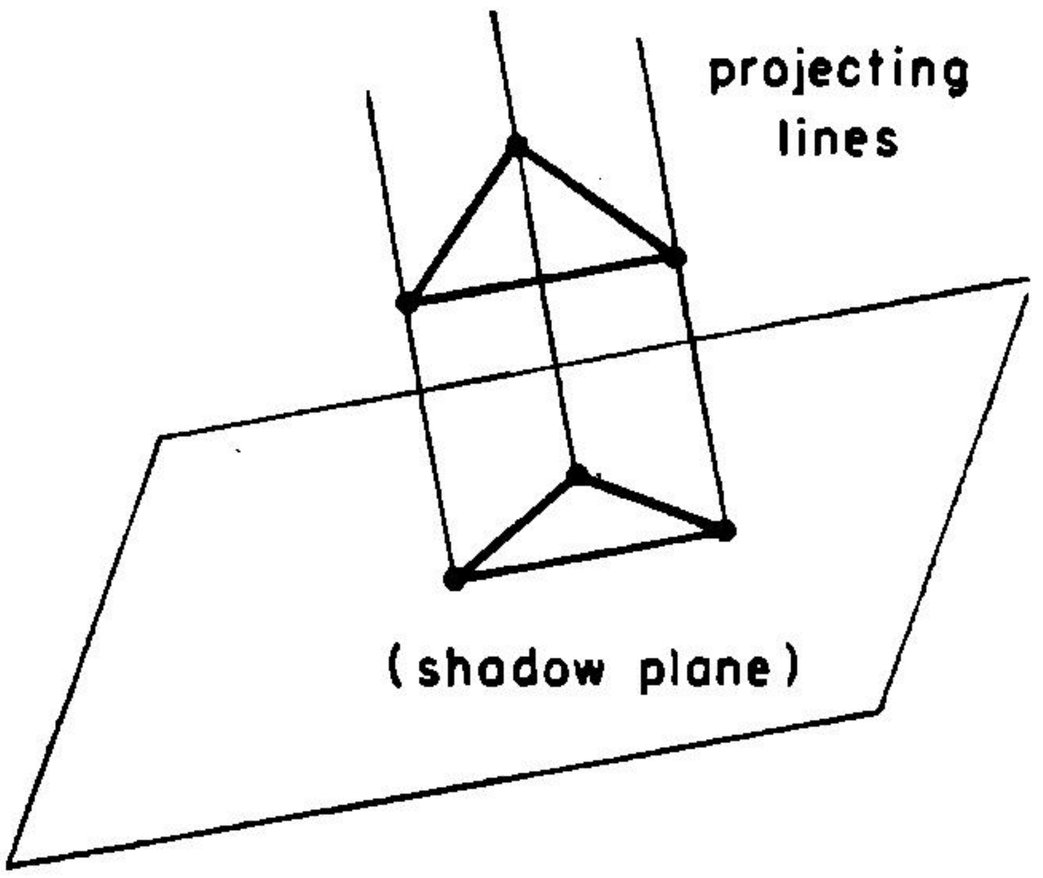
For an introductory definition, we may think of topology as an exceedingly general geometry. In order to make this rigorous, then, let us go back to plane Euclidean geometry

and look at it from a different standpoint. I must confess that even as a professional mathematician, I remember very little about geometry as taught in school but this lack of memory is unimportant for our purposes. All we need here is the concept of *congruence.* Two figures are congruent if one can be moved onto the other by a *rigid motion*, i.e. a motion which allows no distortions at all. Now if we list those properties—such as magnitude of angles, areas, lengths, et cetera—which are studied in geometry, we will find that each such property is preserved by any rigid motion of a figure. For example, if a triangle with a horizontal base is rigidly moved so that the base is vertical, our geometer doesn't care. He says the figure is unchanged because none of his properties have been disturbed.

As was slowly realized over the years and formulated explicitly by Felix Klein in his famous "Erlanger Program," the entire subject of geometry can be studied in terms of these rigid motions. In fact, we can define plane geometry as the study of those properties of geometric figures which remain unchanged—are invariant—under a rigid motion. Since we are all familiar with such properties from everyday experience, we need not list examples. But I would like to point out that it is as important for the geometer to recognize *non*-invariant properties as to know the invariant ones.

In moving the triangle, for instance, the color, weight, material, et cetera, of the figure plays no role as far as the geometer is concerned. Such attention to non-invariant properties is particularly important in the exploratory stage of mathematical research and this applies even more strongly to the generalizations to be discussed next.

The mathematician, always interested in generalizing, asks: "What happens to geometry if I allow some less restrictive sort of 'motion' of figures?" Well, let us find out. For a start in this direction, we will consider *affine geometry*. Following Klein's Erlanger Program, it will only be necessary to describe the sort of motions—or transformations, to use a technical term—of figures which will be permitted. If we call these by the name "*affine transformations*," we will then define affine geometry as the study of those properties of geometric figures which are invariant under an

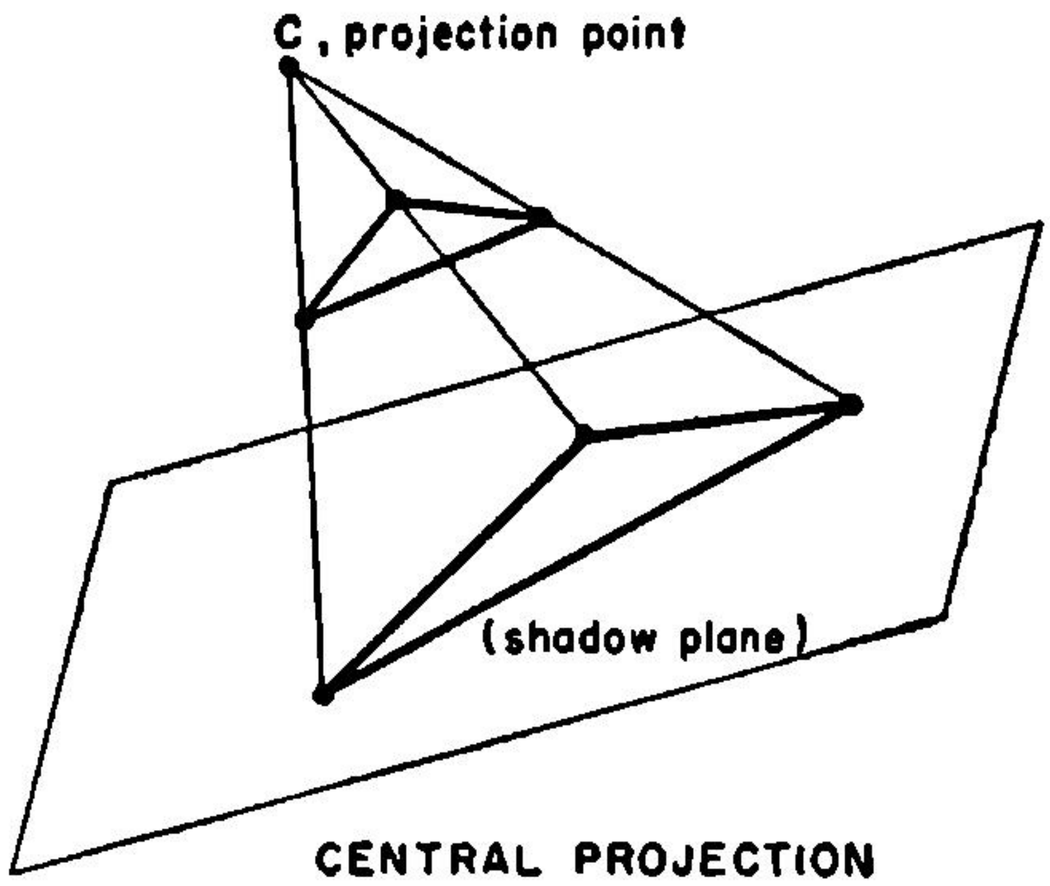


PARALLEL PROJECTION
DIAGRAM 13

affine transformation. With this in mind, then, we say that an affine transformation is the result of a parallel projection of the figure onto some plane surface. This roughly corresponds to a shadow cast on a wall by an object held in the sunlight—I say roughly, because the sun's rays are only approximately parallel. Diagram 13 shows an example of the parallel projection of a triangle.

It should be pointed out that if the plane of the figure and the shadow plane are parallel and perpendicular to the projection lines, then we have an ordinary rigid motion. So plane geometry may be considered to be a special case of affine geometry. A little experimentation with a few pencils held in the sunlight will easily show that lengths, areas, and angles are not invariant. What is invariant? A surprising amount! For example, a straight line transforms into a straight line, parallelism of lines is preserved, and a conic section—circle, ellipse, parabola, hyperbola—transforms into a conic section—although holding a dish in the sunlight shows that a circle can be transformed into an ellipse, et cetera.

Another step in the desired direction brings us to the subject of *projective geometry* where the permissible transformations are *central projections*. In terms of shadows again, we may think of a central projection as being the process of casting a shadow of an object on a plane where the source of light is a point—and so the rays are not parallel. Diagram 14 shows a typical central projection of a triangle.



CENTRAL PROJECTION
DIAGRAM 14

A flashlight bulb without lens or reflector is a fair approximation to a point-source of light and will suffice for any experimentation we might want to do with central projections. And again we find that lengths, areas, angles and now even parallelism of lines are not preserved by these transformations. It is true, however, that the other affine properties mentioned are also projective properties—meaning, of course, properties invariant under central projections. Finally, we note that if the projecting point C (diagram 14) is moved off to "infinity," the result is a parallel projection. Thus projective geometry is a valid generalization of affine geometry and hence of Euclid's geometry also.

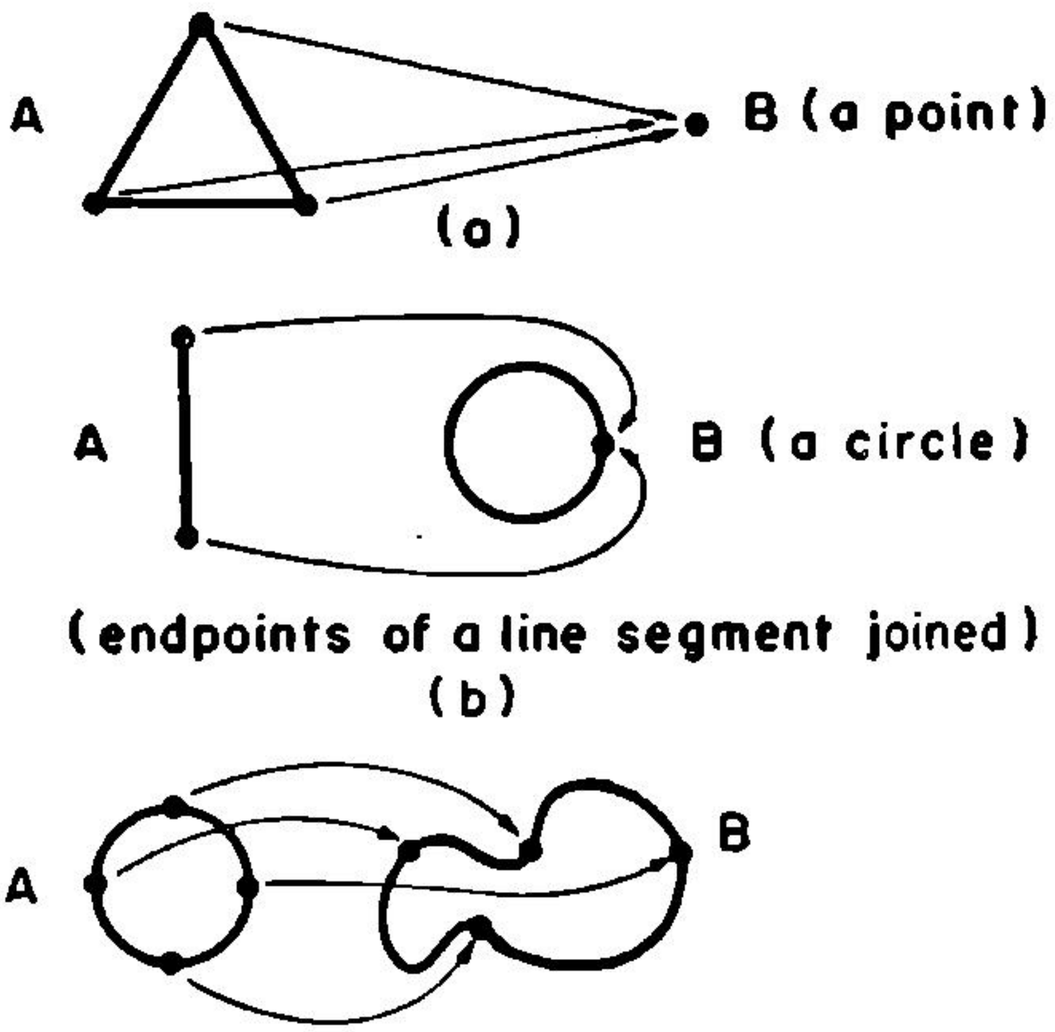
With these two examples to loosen up our thinking, let us go on to gener-

alize in all directions at once. First, in topology we are not content to treat only geometric figures, we want a less restrictive class of objects to discuss. Secondly, we want a great deal more freedom in transforming these objects. Our first desire is satisfied by the introduction of *topological spaces* and the second by allowing transformations called *homeomorphisms*. As we will see, both concepts are basically very simple and also very general.

A topological space consists of a basic collection of undefined "things" called points—just as the points of Euclid are essentially undefined—together with some rule for ascertaining when two points are "close" together. A measure of distance—a metric—such as we have in Euclidean space, is only one way to do this latter job. Under this definition, many surprising collections of things can be made into meaningful topological spaces. For example, any geometric figure is a space in its own right, simply by limiting ourselves to considering only those points in the figure as our basic collection of points and using the usual distance rule to tell when two points are close together. More surprising is that the collection of all people form a space. Here we can take our choice of many available "closeness rules." The degree of closeness can be measured in terms of blood relationships; or in terms of height, weight, head size, et cetera. Finally, let us define the space whose basic collection of points consists of all sky-blue pink, two-legged elephants living on the hot side of the planet Mercury. This last is an empty space, empty in the sense that it contains no elements at all (I trust!). The introduction of an empty or vacuous space in topology or set theory is just as important as the introduction of zero in arithmetic and is not just an odd example. Now, for the remainder of this discussion, we will consider some pair of spaces—any pair at all—and label one A, the other B, just for convenience in referring to them.

Having the objects we want to transform and whose properties will form the subject matter of topology, we need only define the allowable transformations. This takes some time and a few pictures. First, though, a *general transformation* of a space A into a space B is defined simply as a rule for assigning to every point of A some *image* point in B. The resulting collection of points of B is called the image of A under the transformation. For example, a transformation of the space A of all people into the space B of all real numbers might be accomplished by assigning to each person the number corresponding to his height in centimeters. In this example the image of A clearly contains only a part of B—e.q. no person has a negative height nor a height of one thousand centimeters. Another easy transformation of the same two spaces is obtained by assigning the number +1

to every male and −1 to every female —zero may be used in case of doubt. With this illustration of the generality of the notions we are discussing, it is clear that a reasonable theory will be possible only if we restrict ourselves somewhat. This we proceed to do.

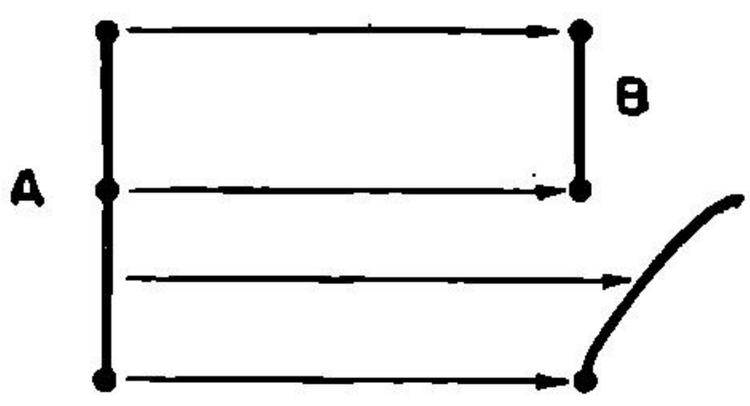


CONTINUOUS TRANSFORMATIONS

DIAGRAM 15

A *continuous transformation* is a general transformation which has this property: If two points of A are close together, then their image points in B are close together and furthermore, the closer the two points are in A, the closer their images are in B. If we think of a point p of A moving so as to approach another point q in A, then the image point p′ in B also approaches the image point q′ of g. Diagram 15 shows several examples of continuous transformations on geometric figures. In each case, the figure on the left is transformed into the figure on the right by the rule explained by means of arrows showing where representative points are sent. It is fairly easy to apply the defining condition and show that these transformations are actually continuous. On the other hand, an example of a noncontinuous transformation is pictured in diagram 16. The "break" shown there is almost characteristic of noncontinuous transformations.

Continuous transformations have been studied extensively and many basic results of topology deal with such. One of the extensively-used theorems in topology is the Brouwer Fixed-Point Theorem. This says that given any continuous transformation of an n-dimensional cube—in any integer—into itself, there is at least one point which is not moved by the transformation. Intuitively, this theorem is described by the following physical analogy: Suppose we have a



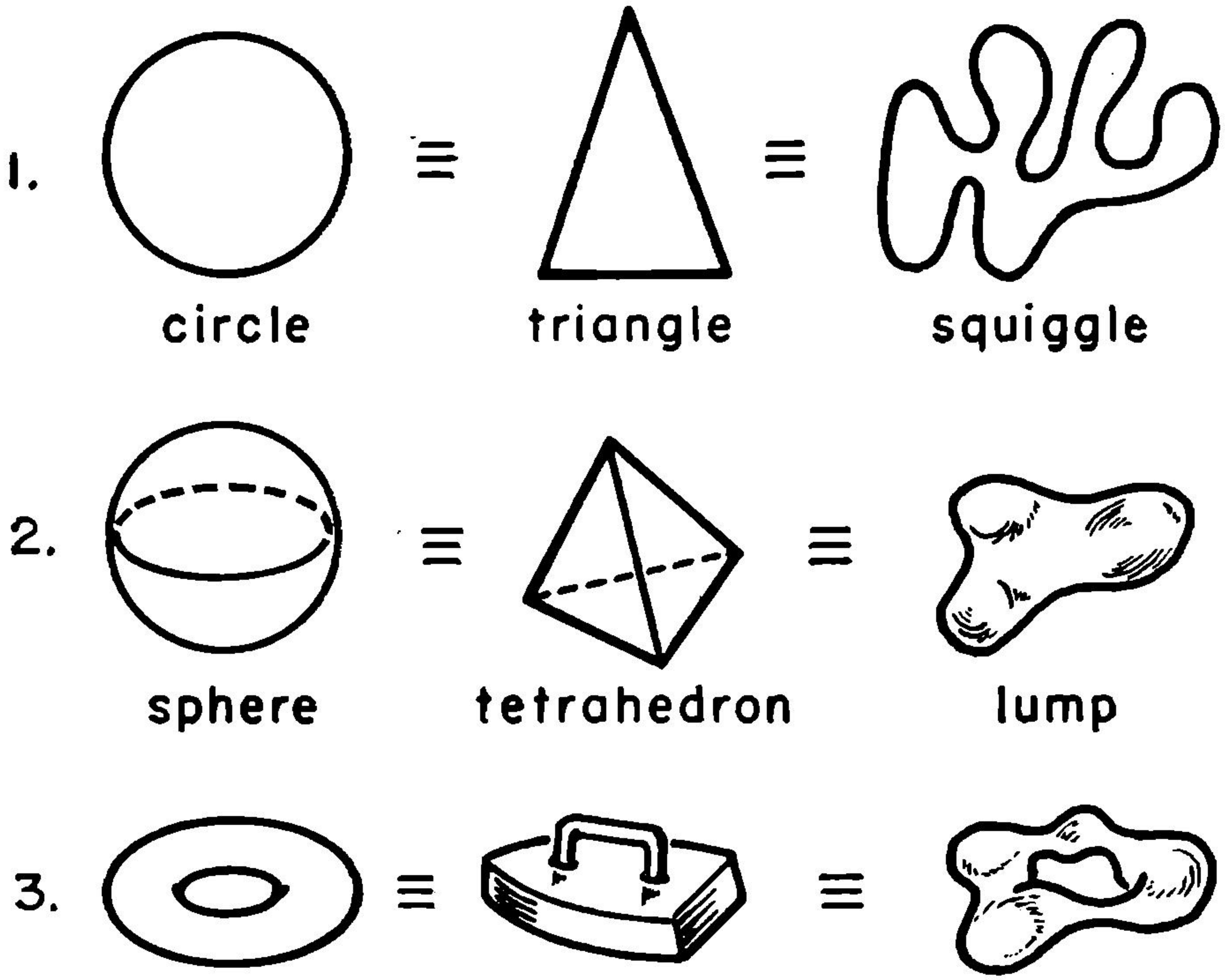
NON-CONTINUOUS TRANSFORMATION

DIAGRAM 16

cube of soft, plastic rubber tightly fitted into a cubical box. We pick out the cube, squeeze it, bend it, fold it—

but never tear it—and then put it back into the box. The theorem states that at least one point is back exactly where it started. A very elegant proof of this theorem may be found in the book by Courant and Robbins which is listed in the references.

Although the topologist constantly uses continuous transformations, these allow too much freedom perhaps to be used as our admissible "motions." For example, it is possible to have a cube as the image of a line segment under a continuous transformation—



TOPOLOGICALLY EQUIVALENT FIGURES

DIAGRAM 17

a very surprising result when first found. Thus we will restrict our transformations a bit more. First, a transformation is said to be one-to-one if every point of the space A has an image point in space B and no two points of A have the same image. Thus in diagram 15, examples (a) and (b) are not one-to-one while (c) is one-to-one. Also, associated with a one-to-one transformation, there is an *inverse transformation* from the image of A in B back to A again, which consists simply of sending each point back to where it started.

For the last step, we define a *homeomorphism* to be a continuous, one-to-one transformation which has a continuous inverse transformation. Again in diagram 15, examples (a) and (b) are not homeomorphisms but example (c) is. And now, finally, we can give a definition of—the geometric aspect of —topology as the study of those properties of topological spaces which are invariant with respect to homeomorphisms. As mentioned above, topology also deals extensively with continuous transformations so this definition is not quite complete but, then, I don't believe anyone has a complete definition. It is almost the same as trying to define mathematics itself which is a state of mind, a manner of thinking, rather than a definable entity.

On the surface of it, the fact that there are some geometric properties so deeply intrinsic as to resist the radical stretching, warping, et cetera of a homeomorphism, may seem surprising. But many such properties are intuitively simple. For example, if we draw a pair of intersecting lines on a sheet of rubber, no amount of bending and stretching will uncross these lines. So here is a topological property. To get a feeling for some such properties, let us look at a few examples of homeomorphic—topologically equivalent—figures. First, in some cases an infinite amount of stretching is allowed, e.g. the points of a plane interior to a circle form a space homeomorphic to the entire infinite plane itself. In diagram 17 are three more sets of topologically equivalent figures. For examples of topologically nonequivalent figures, it may be noted that a circle is not equivalent to a sphere which in turn is not equivalent to a torus.

So it seems that a question about the sort of properties which are topological is both justifiable and difficult to answer. In fact, we do not know all of the topological properties—no more than we know all of the Euclidean properties, for that matter. But, for a subject whose beginnings are found not much more than a century back, a great mass of material is known. A bare list of such properties would serve no purpose and, of course, we cannot hope to list *all* of the topological properties. The many topologists presently active are busily adding new results to an already staggering list at a rate calculated to discourage even

themselves. As in any science, there is no reason to expect an end to the number of results to be found in topology. If an end exists, it is in a future too distant to imagine.

For a conclusion, a few words about the place of topology in mathematics is in order. As the student of topology quickly discovers, many of the basic theorems of the calculus, of the theory of functions, of differential equations and of infinite processes in general, are actually special cases of more general topological theorems. Since the topologist handles continuous transformations on all sorts of spaces, it is usually a simplification to deal with spaces of real or complex numbers as do the above-mentioned topics. Mind you, this simplification is largely on the conceptual level and aids understanding, guides thinking, et cetera. I do not mean to detract in any way from the beautiful and delicate work done in these topics, nor do I imply that topology will do any part of the tough work. I am sure, however, that most mathematicians will agree that the generality of topology has sloughed away the deadwood, the spade work, in many fields.

One of the brightest honors won by topology was in geometry. For many years, the concept of dimension remained all too vague. For a simple figure, it is easy to say "this is two-dimensional" or "that has three dimensions," but of what dimension is the space of all rational numbers (fractions)? Or of the space of all irrational numbers? Of course, the two spaces added together give the space of all real numbers, which is one-dimensional. Does this mean that one or the other of the two spaces—rationals or irrationals—must also be one-dimensional? Well, as a matter of fact, it does not! Both the rationals and irrationals have dimension zero!

Around 1920, Menger and Urysohn, refining some ideas of Henri Poincaré independently hit upon a simple inductive definition of dimension. This definition assigns to any space an integer—or infinity—which for all decidable cases, agrees exactly with our intuition. The ease and beauty of this definition has led to an entire theory of dimension—see the book by Hurewicz and Wallman in the references.

Here is an idea which seems to contain the germ of a good story. One of the major results of the theory of dimension is this: Any n-dimensional space can be imbedded homeomorphically in Euclidean $(2n + 1)$—dimensional space—and 2n dimensions will not always suffice. In view of this, it is not so surprising that the two-dimensional Klein bottle cannot be imbedded in three dimensions. We can actually find—but not visualize—two-dimensional objects which intrinsically belong to five-space. An example is the two-dimensional "surface" of a six-dimensional cube. Carry-

ing this up one step, there are three-dimensional beasties which belong intrinsically to seven-space—never needing eight dimensions. Does the idea appeal?

Concerning algebra, itself a foundational topic, fewer applications of topology are to be found. The present work seems rather to be a mixture of the two—thus we have algebraic topology and topological algebra being very active fields. However, there are a few instances. For example, S. Eilenberg (Columbia) and S. MacLane (Chicago) have recently used cohomology theory, an algebraic tool developed for topological use, to give purely algebraic results. And there are even topological proofs of the fundamental theorem of algebra*. I believe it is safe to say that topology is a fundamental tool in any mathematician's kit and of particular importance for those who deal with infinite processes.

Of perhaps greater interest to the practicing engineer or physicist is the fact that topology offers information concerning the very existence of the solution to a given problem. To see wherein this is important, let us digress a moment. The applied mathematician is usually forced to make simplifying assumptions in order to even formulate a problem in mathematical form. Of course, the physical problem—say, the current function in an electric circuit—has an answer. We can build the circuit in question, push the desired current in at one end and, carefully stepping back, simply watch the meters. But a mathematical solution is cheaper—or is it? Suppose the formulation leads to a nasty-looking, non-linear differential equation? It may not have a solution at all! So hundreds of man-hours could be spent on asymptotic expansions, et cetera and/or thousands of dollars of electronic computer time could be wasted, all to no avail. It is often possible to know in advance if there *is* a solution

* The so-called fundamental theorem of algebra, first proved by Gauss in his doctoral dissertation (1799), says that every polynomial equation has a root in the complex number field. That is, given any equation such as $7x^5 - 3x^3 + 2x - 11 = 0$, there is at least one (complex) number satisfying the equation.

to find, and topology can do it.

The particular theory which is used for the sort of "existence proof" discussed above is an extension of the Brouwer fixed-point theorem described earlier. Briefly, one thinks of the differential equation as defining a transformation of a generalized cube —in a space of functions—into itself. Under the proper conditions, this is a continuous transformation and so there will be a fixed "point" i.e. a function, which is a solution. The Brouwer theorem says nothing about locating the fixed point, and neither do the extensions of this theorem. But we do know that the solution is there to be found!

A part of the extensions of the same Brouwer theorem can also be used to prove a few conversation-stopping statements about meteorology. For instance, at any moment there is at least one spot on earth enjoying a dead calm. Also, there is at any instant at least one pair of antipodal points on earth where the pressure and temperature readings are exactly the same. Another—not quite accurate—application is found in the profound remark that every non-bald man has a cowlick. (Actually this would only be true of an animal such as the hairy kuguait from Mira VII which, as everyone knows, is a perfectly spherical beast with no distinguishing features, orifices or the like).

Well, I hope I have shown that topology can be fun and is also important. For further reading, a few references are listed below. Many fascinating applications of mathematics are contained in the delightful book by Steinhaus. And for a lucid and enjoyable exposition of much of mathematics, the book by Courant and Robbins is unbeatable. The two magazine articles are of a popular nature and the remaining books are on the textbook level. From my own experience, I can promise a wonderful, habit-forming hobby—also frustrating at times—to anyone delving into the subject. If my son ever expresses a desire to study mathematics, when he recovers from the beating I will administer for such foolishness, I will hand him a book on—Topology!

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THE END

SUCKER BAIT

BY ISAAC ASIMOV

Conclusion. *The Mystery of the Lethal World was just the sort of thing the Mnemonic Corps was intended to handle. But the personality problem was one the Mnemonic trainees did spectacularly—not handle well!*

Illustrated by Kelly Freas

SYNOPSIS

"Junior" is the name given to a planet with two suns, situated in the Hercules star-cluster. The planet and the two suns—one is blue-white and one is red-orange—are at the apices of an equilateral triangle and revolve as a unit about the center of gravity of the system. Junior is just emerging from an ice age. It is not known to carry intelligent life. Its plant and animal life, as a whole, are not dangerous and are, in fact, very edible and nutritious in many cases. In every possible way, it would seem that Junior is an ideal world for human life.

There is only one trouble. A hundred years before the time of the story, a

colony of a thousand men, women and children have been wiped out in a little over a year's time for some mysterious reason, possibly disease. The Galactic Government, anxious to utilize Junior for colonization purposes, has sent out a scientific expedition on the ship George G. Grundy *to determine the cause of death of the first expedition.*

Outside of the crew, the only member of the expedition who is not a scientist is Mark Annuncio, a young man of twenty, who is a member of a newly-founded organization known as the Mnemonic Bureau. The "Mnemonics" are youngsters especially trained in the direction of the development of their latent talents of eidetic memory and total recall. It is their function to fill themselves with all possible varieties of data in order that occasionally they may make a correlation across widely-separated fields of knowledge that would never be made by the ordinary scientific specialists, who are too restricted in their field of science.

Mark is under the care of his psychologist teacher, Oswald Sheffield, who protects him from the "noncompos"—short for "non compos mentis," *a term used by Mnemonics for all other humans—on the ship, who distrust the youngster as a nosy and annoying busybody.*

The leader of the scientific group is Emmanuel Cimon, astrophysicist, a cold, stiff personality particularly antagonistic to Mark. His observations of Junior from space yield nothing of value, although the planet's beauty under the double sun of different colors is remarkable.

Upon landing, Boris Vernadsky, geochemist, examines the atmosphere exhaustively, and finds it ideal. Miguel Rodriguez, microbiologist and Grool Novee, physician, seek for pathogenic agents in the air and soil, but find none. Nevile Fawkes, botanist, takes a small vessel to the site of the ill-fated first expedition but finds nothing to indicate the nature of their fate.

Meanwhile, Captain Follenbee, skipper of the vessel, is growing worried. His men have not been told of the nature of the expedition because planets on which human colonies have died—i.e. "sucker bait" planets—are regarded with a deep and superstitious fear, particularly by spaceship crewmen. The long wait on Junior without the crew being allowed to leave the ship—despite the fact that the planet seems so pleasant and livable—is disturbing the crew and giving rise to unrest.

Cimon agrees to consider granting "surface leave" and calls a full-scale meeting of the scientific complement for a discussion of the results of the studies thus far.

Mark Annuncio, the young Mnemonic, has throughout the investigation been slinking about the outskirts. He is an unhappy, ill-adjusted, introspective person, homesick and lonely for his own kind; exceedingly distrustful of the ordinary human beings with whom he has come into close contact for the first

time, and passionately driven by a fanatic desire to gather data, any kind of data.

He now attends the first complete get-together of the scientists and listens excitedly to the discussion. At one point he questions Rodriguez concerning one of the statements made by the microbiologist. Rodriguez considers the question a reflection on his professional status. (In these days of extreme specialization, it is very bad form to doubt a man's word, or even to question it, on anything related to his specialty, unless you yourself are also a member of the specialty.)

Rodriguez angrily refuses to answer Mark's question, whereupon Mark loses his temper, screams with rage and has to be carried bodily from the conference room by his mentor, Sheffield.

Part 2

Inside the observatory room, Cimon, looking haggard, said, "All right. All right. Let's get back to the point. Come on, now. Quiet! I'm accepting Rodriguez's viewpoint. It's good enough for me and I don't suppose there's anyone else here who questions Rodriguez's professional opinion."

("Better not," muttered Rodriguez, his dark eyes hot with sustained fury.)

Cimon went on. "And since there's nothing to fear as far as infection is concerned, I'm telling Captain Follenbee that the crew may take surface leave without special protection against the atmosphere. Apparently the lack of surface leave is bad for morale. Are there any objections?"

There weren't any.

Cimon said, "I see no reason also why we can't pass on to the next stage of the investigation. I propose that we set up camp at the site of the original settlement. I appoint a committee of five to trek out there. Fawkes, since he can handle the coaster; Novee and Rodriguez to handle the biological data; Vernadsky and myself to take care of the chemistry and physics.

"The rest of you will, naturally, be apprised of all pertinent data in your own specialties, and will be expected to help in suggesting lines of attack, et cetera. Eventually, we may all be out there, but for the while only this small group. And until further notice, communication between ourselves and the main group on ship will be by radio only, since if the trouble, whatever it is, turns out to be localized at settlement site, five men are enough to lose."

Novee said, "The settlement lived on Junior several years before dying out—over a year, anyway. It could be a long time before we are certain we're safe."

"We," said Cimon, "are not a settlement. We are a group of specialists who are looking for trouble. We'll find it if it's there to find, and when we do find it, we'll beat it. And it won't

take us a couple of years either. Now, are there any objections?"

There were none, and the meeting broke up.

Mark Annuncio sat on his bunk, hands clasped about his knee, chin sunken and touching his chest. He was dry-eyed now, but his voice was heady with frustration.

"They're not taking me," he said. "They won't let me go with them."

Sheffield was in the chair opposite the boy, bathed in an agony of perplexity. He said, "They may take you later on."

"No," said Mark, fiercely, "they won't. They hate me. Besides, I want to go now. I've never been on another planet before. There's so much to see and find out. They've got no right to hold me back if I want to go."

Sheffield shook his head. Mnemonics were so firmly trained into this belief that they *must* collect facts, and that no one or nothing could or ought to stop them. Perhaps when they returned, he might recommend a certain degree of counter-indoctrination. After all, Mnemonics had to live in the real world, occasionally. More and more with each generation, perhaps, as they grew to play an increasing role in the galaxy.

He tried an experiment. He said, "It may be dangerous, you know."

"I don't care. I've got to know. I've *got* to find out about this planet. Dr. Sheffield, you go to Dr. Cimon and tell him I'm going along."

"Now, Mark."

"If you don't, I will." He raised his small body from the bed in earnest of leaving that moment.

"Look, you're excited."

Mark's fists clenched. "It's not fair, Dr. Sheffield. I found this planet. It's *my* planet."

Sheffield's conscience hit him badly. What Mark saw was true in a way. No one, except Mark, knew that better than Sheffield. And no one, again except Mark, knew the history of Junior better than Sheffield.

It was only in the last twenty years that, faced with the rising tide of population pressure in the older planets and the recession of the Galactic frontier from those same older planets, that the Confederation of Worlds began exploring the galaxy systematically. Before that, human expansion went on hit or miss. Men and women in search of new land and a better life followed rumor as to the existence of habitable planets or sent out amateur groups to find something promising.

A hundred ten years before, one such group found Junior. They didn't report their find officially because they didn't want a crowd of land speculators, promotion men, exploiters and general riffraff following. In the next months, some of the unattached men arranged to have women brought in, so the settlement must have flourished for a while.

It was a year later when some had

died and most or all the rest were sick and dying that they beamed a cry of help to Pretoria, the nearest inhabited planet. The Pretorian government was in some sort of crisis at the time and relayed the message to the Sector Government at Altmark. Pretoria then felt justified in forgetting the matter.

The Altmark government, acting in reflex fashion, sent out a medical ship to Junior. It dropped anti-sera and various other supplies. The ship did not land because the medical officer diagnosed the matter, from a distance, as influenza, and minimized the danger. The medical supplies, his report said, would handle the matter perfectly. It was quite possible that the crew of the ship, fearing contagion, had prevented a landing, but nothing in the official report indicated that.

There was a final report from Junior three months later to the effect that only ten people were left alive and that they were dying. They begged for help. This report was forwarded to Earth itself along with the previous medical report. The Central Government, however, was a maze in which reports regularly were forgotten unless someone had sufficient personal interest, and influence, to keep them alive. No one had much interest in a far-off, unknown planet with ten dying men and women on it.

Filed and forgotten—and for a century, no human foot was felt on Junior.

Then, with the new furore over Galactic exploration, hundreds of ships began darting through the empty vastness, probing here and there. Reports trickled in, then flooded in. Some came from Hidosheki Mikoyama, who passed through the Hercules Cluster twice—dying in a crash landing the second time, with his tight and despairing voice coming over the subether in a final message: "Surface coming up fast now; shipwalls frictioning into red he—" and no more.

Last year, the accumulation of reports, grown past any reasonable human handling, was fed into the overworked Washington computer on a priority so high that there was only a five-month wait. The operators checked out the data for planetary habitability and lo, Abou ben Junior led all the rest.

Sheffield remembered the wild hurrah over it. The stellar system was enthusiastically proclaimed to the galaxy and the name, Junior, was thought up by a bright young man in the Bureau of Outer Provinces who felt the need for personal friendliness between man and world. Junior's virtues were magnified. Its fertility, its climate—"a New England perpetual spring"—and most of all, its vast future, were put across without any feeling of need for discretion. For the next million years, propagandists declared, Junior will grow richer. While other planets

age, Junior will grow younger as the ice recedes and fresh soil is exposed. Always a new frontier; always untapped resources.

For a million years!

It was the Bureau's masterpiece. It was to be the tremendously successful start of a program of government-sponsored colonization. It was to be the beginning, at long last, of the scientific exploitation of the galaxy for the good of humanity.

And then came Mark Annuncio, who heard much of all this and was as thrilled at the prospect as any Joe Earthman, but who one day thought of something he had seen while sniffing idly through the "dead-matter" files of the Bureau of Outer Provinces. He had seen a medical report about a colony on a planet of a system whose description and position in space tallied with that of the Lagrange group.

Sheffield remembered the day Mark came to him with that news.

He also remembered the face of the Secretary for the Outer Provinces when the news was passed on to *him*. He saw the secretary's square jaw slowly go slack and a look of infinite trouble come into his eyes.

The government was committed! It was going to ship millions of people to Junior. It was going to grant farmland and subsidize the first seed supplies, farm machinery, factories. Junior was going to be a paradise for numerous voters and a promise of more paradise for a myriad others.

If Junior turned out to be a killer planet for some reason or other, it would mean political suicide for all government figures concerned in the project. That meant some pretty big men, not least the Secretary for the Outer Provinces.

After days of checking and indecision, the secretary had said to Sheffield, "It looks as though we've got to find out what happened, and weave it into the propaganda somehow. Don't you think we could neutralize it that way?"

"If what happened isn't too horrible to neutralize."

"But it can't be, can it? I mean, what can it be?" The man was miserably unhappy.

Sheffield shrugged.

The secretary said, "See here. We can send a ship of specialists to the planet. Volunteers only and good reliable me, of course. We can give it the highest priority rating we can move, and Project Junior carries considerable weight, you know. We'll slow things up here, and hold on till they get back. That might work, don't you think?"

Sheffield wasn't sure, but he got the sudden dream of going on that expedition, of taking Mark with him. He could study a Mnemonic in an off-trail environment, and if Mark *should* be the means of working out the mystery—

From the beginning, a mystery was assumed. After all, people don't die of

influenza. And the medical ship hadn't landed; they hadn't *really* observed what was going on. It was fortunate, indeed, that that medical man was now dead thirty-seven years, or he would be slated for court-martial now.

If Mark *should* help solve the matter, the Mnemonic Service would be enormously strengthened. The government had to be grateful.

But now—

Sheffield wondered if Cimon knew the story of how the matter of the first settlement had been brought to light. He was fairly certain that the rest of the crew did not. It was not something the Bureau would willingly speak about.

Nor would it be politic to use the story as a lever to pry concessions out of Cimon. If Mark's correction of Bureau "stupidity"—that would undoubtedly be the opposition's phrasing—were overpublicized, the Bureau would look bad. If they could be grateful, they could be vengeful, too. Retaliation against the Mnemonic Service would not be too petty a thing to expect.

Still—

Sheffield stood up with quick decision. "All right, Mark. I'll get you out to the settlement site. I'll get us both out there. Now you sit down and wait for me. Promise you'll try nothing on your own."

"All right," said Mark. He sat down on his bunk again.

"Well, now, Dr. Sheffield, what is it?" said Cimon. The astrophysicist sat at his desk, on which papers and film formed rigidly arranged heaps about a small Macfreed integrator and watched Sheffield step over the threshold.

Sheffield sat carelessly down upon the tautly yanked top-sheet of Cimon's bunk. He was aware of Cimon's annoyed glance in that direction and it did not worry him. In fact, he rather enjoyed it.

He said, "I have a quarrel with your choice of men to go to the expedition site. It looks as though you've picked two men for the physical sciences, and three for the biological sciences. Right?"

"Yes."

"I suppose you think you've covered the ground like a Danielski ovospore at perihelion."

"Oh, space! Have you anything to suggest?"

"I would like to come along myself."

"Why?"

"You have no one to take care of the mental sciences."

"The *mental* sciences! Good galaxy! Dr. Sheffield, five men are quite enough to risk. As a matter of fact, doctor, you and your . . . uh . . . ward were assigned to the scientific personnel of this ship by order of the Bureau of Outer Provinces without any prior consultation of myself. I'll be frank—if I had been consulted, I

would have advised against you. I don't see the function of mental science in an investigation such as this, which, after all, is purely physical. It is too bad that the Bureau wishes to experiment with Mnemonics on an occasion such as this. We can't afford scenes like that one with Rodriguez."

Sheffield decided that Cimon did not know of Mark's connection with the original decision to send out the expedition.

He sat upright, hands on knees, elbows cocked outward and let a freezing formality settle over him. "So you wonder about the function of mental science in an investigation such as this, Dr. Cimon. Suppose I told you that the end of the first settlement might possibly be explained on a simple, psychological basis."

"It wouldn't impress me. A psychologist is a man who can explain anything and prove nothing." Cimon smirked like a man who had made an epigram and was proud of it.

Sheffield ignored it. He said, "Let me go into a little detail. In what way is Junior different from every one of the eighty-three thousand inhabited worlds?"

"Our information is as yet incomplete. I cannot say."

"Oh, cobber-vitals. You had the necessary information before you ever came here. Junior has two suns."

"Well, of course." But the astrophysicist allowed a trace of discomfiture to enter his expression.

"Colored suns, mind you. Colored suns. Do you know what that means? It means that a human being yourself or myself, standing in the full glare of the two suns, would cast two shadows. One blue-green, one red-orange. The length of each would naturally vary with the time of day. Have you taken the trouble to verify the color distribution in those shadows? The what-do-you-call-em—reflection spectrum?"

"I presume," said Cimon, loftily, "they'd be about the same as the radiation spectra of the suns. What are you getting at?"

"You should check. Wouldn't the air absorb some wave-lengths? And the vegetation? What's left? And take Junior's moon, Sister. I've been watching it in the last few nights. It's in colors, too, and the colors change position."

"Well, of course. It runs through its phases independently with each sun."

"You haven't changed its reflection spectrum, either, have you?"

"We have that somewhere. There are no points of interest about it. Of what interest is it to you, anyway?"

"My dear Dr. Cimon. It is a well established psychological fact that combinations of red and green colors exert a deleterious effect on mental stability. We have a case here where the red-green chromopsychic picture —to use a technical term—is inescapa-

ble and is presented under circumstances which seem most unnatural to the human mind. It is quite possible that chromopsychosis could reach the fatal level by inducing hypertrophy of the trinitarian follicles with consequent cerebric catatonia." .

Cimon looked floored. He said, "I never heard of such a thing."

"Naturally not," said Sheffield—it was his turn to be lofty. "You are not a psychologist. Surely you are not questioning my professional opinion."

"No, of course not. But it's quite plain from the last reports of the expedition that they were dying of something that sounded like a respiratory disease."

"Correct, but Rodriguez denies that and you accepted his professional opinion."

"I didn't say it was a respiratory disease. I said it sounded like one. Where does your red-green cromothingumbob come in?"

Sheffield shook his head. "You laymen have your misconceptions. Granted that there is a physical effect, it still does not imply that there may not be a mental cause. The most convincing point about my theory is that red-green chromopsychosis has been recorded to exhibit itself first as a psychogenic respiratory infection. I take it you are not acquainted with psychogenics."

"No. It's out of my field."

"Well, yes. I should say so. Now my own calculations show me that under the heightened oxygen tension of this world the psychogenic respiratory infection is both inevitable and particularly severe. For instance, you've observed the moon—Sister, I mean—in the last few nights."

"Yes, I have observed Ilium." Cimon did not forget Sister's official name, even now.

"You watched it closely and over lengthy periods? Under magnification?"

"Yes." Cimon was growing uneasy.

"Ah," said Sheffield, "now the moon colors in the last few nights have been particularly virulent. Surely you must be noticing just a small inflammation of the mucous membrane of the nose, a slight itching in the throat. Nothing painful yet, I imagine. Have you been coughing or sneezing? Is it a little hard to swallow?"

"I believe I—" Cimon swallowed, then drew in his breath sharply. He was testing.

Then he sprang to his feet, fists clenched and mouth working. "Great galaxy, Sheffield, you had no right to keep quiet about this. I can feel it now. What do I do, Sheffield? It's not incurable, is it? Damn it, Sheffield" —his voice went shrill—"why didn't you tell us this before?"

"Because," said Sheffield, calmly, "there's not a word of truth in anything I've said. Not one word. There's no harm in colors. Sit down, Dr. Cimon. You're beginning to look rather

foolish to say the least."

"You said," said Cimon, thoroughly confused, and in a voice that was beginning to strangle, "that it was your professional opinion that—"

"My professional opinion! Space and little comets, Cimon, what's so magic about a professional opinion. A man can be lying or he can just plain be ignorant, even about the final details of his own specialty. A professional can be wrong because he's ignorant of a neighboring specialty. He may be certain he's right and still be wrong.

"Look at you. You know all about what makes the universe tick and I'm lost completely except that I know that a star is something that twinkles and a light-year is something that's long. And yet you'll swallow gibberish-psychology that a freshman student of mentics would laugh his head off at. Don't you think, Cimon, it's time we worried less about professional opinion and more about over-all co-ordination?"

The color washed slowly out of Cimon's face. It turned waxy-pale. His lips trembled. He whispered, "You used professional status as a cloak to make a fool of me."

"That's about it," said Sheffield.

"I have never, *never*—" Cimon gasped and tried a new start. "I have never witnessed anything as cowardly and unethical."

"I was trying to make a point."

"Oh, you made it. You made it." Cimon was slowly recovering; his voice approaching normality. "You want me to take that boy of yours with us."

"That's right."

"No. No. Definitely no. It was no before you came in here and it's no a million times over now."

"What's your reason? I mean, before I came in."

"He's psychotic. He can't be trusted with normal people."

Sheffield said, grimly, "I'll thank you not to use the word, 'psychotic.' You are not competent to use it. If you're so precise in your feeling for professional ethics, remember to stay out of my specialty in my presence. Mark Annuncio is perfectly normal."

"After that scene with Rodriguez? Yes. Oh, yes."

"Mark had the right to ask his question. It was his job to do so and his duty. Rodriguez had no right to be boorish about it."

"I'll have to consider Rodriguez first, if you don't mind."

"Why? Mark Annuncio knows more than Rodriguez. For that matter, he knows more than you or I. Are you trying to bring back an intelligent report or to satisfy a petty vanity?"

"Your statements about what your boy knows do not impress me. I am quite aware he is an efficient parrot.. He understands nothing, however. It is my duty to see to it that data are made available to him, because the Bureau has ordered that. They did not consult me, but very well. I will co-operate that far. He will receive his data here in the ship."

Sheffield said, "Not adequate, Cimon. He should be on the spot. He may see things our precious specialists will not."

Cimon said, freezingly, "Very likely. The answer, Sheffield, is no. There is no argument that can possibly persuade me." The astrophysicist's nose was pinched and white.

"Because I made a fool of you?"

"Because you violated the most fundamental obligation of a professional man. No respectable professional would ever use his specialty to prey on the innocence of a non-associate professional."

"So I made a fool of you."

Cimon turned away. "Please leave. There will be no further communication between us, outside the most necessary business, for the duration of the trip."

"If I go," said Sheffield, "the rest of the boys may get to hear about this."

Cimon started. "You're going to repeat our little affair?" A cold smile rested on his lips, then went its transient and contemptuous way. "You'll broadcast the dastard you were."

"Oh. I doubt they'll take it seriously. Everyone knows psychologists will have their little jokes. Besides they'll be so busy laughing at you.

You know—the very impressive Dr. Cimon scared into a sore throat and howling for mercy after a few mystic words of gibberish."

"Who'd believe you?" cried Cimon.

Sheffield lifted his right hand. Between thumb and forefinger was a small rectangular object, studded with a line of control toggles.

"Pocket recorder," he said. He touched one of the toggles and Cimon's voice was suddenly saying, "Well, now, Dr. Sheffield, what is it?"

It sounded pompous, peremptory, and even a little smug.

"Give me that!" Cimon hurled himself at the lanky psychologist.

Sheffield held him off. "Don't try force, Cimon. I was in amateur wrestling not too long ago. Look, I'll make a deal with you."

Cimon was still writhing toward him, dignity forgotten, panting his fury. Sheffield kept him at arm's length, backing slowly.

Sheffield said, "Let Mark and myself come along and no one will ever see or hear this."

Slowly, Cimon simmered down. He gasped, "Will you let me have it, then?"

"After Mark and I are out at the settlement site."

"I'm to trust *you*." He seemed to take pains to make that as offensive as possible.

"Why not? You can certainly trust me to broadcast this if you *don't* agree. I'll play it off for Vernadsky first. He'll love it. You know his corny sense of humor."

Cimon said in a voice so low it could hardly be heard, "You and the boy can come along." Then, vigorously, "But remember this, Sheffield: When we get back to Earth, I'll have you before the Central Committee of the G.A.A.S. That's a promise. You'll be de-professionalized."

Sheffield said, "I'm not afraid of the Galactic Association for the Advancement of Science." He let the syllables resound. "After all, what will you accuse me of? Are you going to play this recording before the Central Committee as evidence? Come, come, let's be friendly about this. You don't want to broadcast your own . . . uh . . . mistake before the primmest stuffed shirts in eighty-three thousand worlds."

Smiling gently, he backed out the door.

But when he closed the door between himself and Cimon, his smile vanished. He hadn't liked to do this. Now that he had done it, he wondered if it were worth the enemy he had made.

Seven tents had sprung up near the site of the original settlement on Junior. Nevile Fawkes could see them all from the low ridge on which he stood. They had been there seven days now.

He looked up at the sky. The clouds were thick overhead and pregnant

with rain. That pleased him. With both suns behind those clouds, the diffused light was gray-white. It made things seem almost normal.

The wind was damp and a little raw, as though it were April in Vermont. Fawkes was a New Englander and he appreciated the resemblance. In four or five hours, Lagrange I would set and the clouds would turn ruddy while the landscape would become angrily dim. But Fawkes intended to be back in the tents by then.

So near the equator, yet so cool! Well, that would change with the millennia. As the glaciers retreated, the air would warm up and the soil would dry out. Jungles and deserts would make their appearance. The water level in the oceans would slowly creep higher wiping out numberless islands. The two large rivers would become an inland sea, changing the configuration of Junior's one large continent; perhaps making several smaller ones out of it.

He wondered if the settlement site would be drowned. Probably, he decided. Maybe that would take the curse off it.

He could understand why the Confederation were so anxious to solve the mystery of that first settlement. Even if it were a simple matter of disease, there would have to be proof. Otherwise, who would settle the world? The "sucker bait" superstition held for more than merely spacemen.

He, himself— Well, his first visit to the settlement site hadn't been so bad, though he had been glad to leave the rain and the gloom. Returning was worse. It was difficult to sleep with the thought that a thousand mysterious deaths lay all about, separated from him only by that insubstantial thing, time.

With medical coolness, Novee had dug up the moldering graves of a dozen of the ancient settlers. (Fawkes could not and did not look at the remains.) There had been only crumbling bones, Novee had said, out of which nothing could be made.

"There seem to be abnormalities of bone deposition," he said.

Then on questioning, he admitted that the effects might be entirely owing to a hundred years exposure to damp soil.

Fawkes had constructed a fantasy that followed him even into his waking hours. It concerned an elusive race of intelligent beings dwelling underground, never being seen but haunting that first settlement a century back with a deadly perseverance.

He pictured a silent bacteriological warfare. He could see them in laboratories beneath the tree roots, culturing their molds and spores, waiting for one that could live on human beings. Perhaps they captured children to experiment upon.

And when they found what they were looking for, spores drifted silently out over the settlement in venomous clouds—

Fawkes knew all this to be fantasy. He had made it up in the wakeful nights out of no evidence but that of his quivering stomach. Yet alone in the forest, he whirled more than once in a sudden horror-filled conviction that bright eyes were staring out of the duskiness of a tree's Lagrange I shadow.

Fawkes' botanist's eye did not miss the vegetation he passed, absorbed as he was. He had deliberately struck out from camp in a new direction, but what he saw was what he had already seen. Junior's forests were neither thick nor tangled. They were scarcely a barrier to travel. The small trees—few were higher than ten feet, although their trunks were nearly as thick as the average Terrestrial tree—grew with considerable room between them.

Fawkes had constructed a rough scheme for arranging the plant-life of Junior into some sort of taxonomic order. He was not unaware of the fact that he might be arranging for his own immortality.

There was the scarlet "bayonet tree," for instance. Its huge, scarlet flowers attracted insectlike creatures that built small nests within it. Then—at what signal or what impulse Fawkes had not divined—all the flowers on some one given tree would grow a glistening white pistil over night. Each pistil stood two feet high, as though every bloom had been suddenly equipped with a bayonet.

By the next day, the flower had been fertilized, and the petals closed shut—about pistil, insects and all. The explorer, Makoyama, had named it the "bayonet tree," but Fawkes had made so bold as to rename it *Migrania Fawkesii*.

One thing the trees had in common. Their wood was incredibly tough. It would be the task of the biochemist to determine the physical state of the cellulose molecule and that of the biophysicist to determine how water could be transported through the wood's impervious texture. What Fawkes knew from experience was that blossoms would break if pulled, that stems would bend only with difficulty and break not at all. His pocketknife was blunted without as much as making a scratch.

The original settlers, in order to clear land, had obviously had to dig out the trees, root and all.

Compared to Earth, the woods were almost free of animal life. That might be due to the glacial slaughter. Fawkes didn't know.

The insectlike creatures were all two winged. And those wings were feathery little fronds that beat noiselessly. None, apparently, were bloodsuckers.

The only major experience with animals that they had had was the sudden appearance of a large flying creature over the camp. It took high-speed photography to reveal the actual shape of the beast, for the specimen

they observed, apparently overcome with curiosity, swooped low over the tents, again and again, at speeds too great for comfortable, naked-eye observation.

It was four-winged, the forward wings terminating in powerful claws, being membranous and nearly naked, serving the office of gliding planes. The hind pair, covered with a hairlike fuzz, beat rapidly.

Rodriguez suggested the name *Tetraplerus*.

Fawkes paused in his reminiscence to look at a variety of grass he had not seen before. It grew in a dense patch and each stem forked in three toward the top. He brought out his magnifying glass, and felt one of the stems gingerly with his finger. Like other grasses on Junior, it—

It was here that he heard the rustle behind him—unmistakable. He listened for a moment, his own heartbeat drowning the sound, then whirled. A small manlike object dodged behind a tree.

Fawkes' breathing nearly stopped. He fumbled for the blaster he wore and his hand seemed to be moving through molasses.

Was his fantasy no fantasy at all? Was Junior inhabited after all?

Numbly, Fawkes found himself behind another tree. He couldn't leave it at this. He knew that. He could not report to the rest: I saw something alive. It might have been the answer to everything. But I was afraid and let it get away.

He would have to make some attempt.

There was a "chalice tree" just behind the tree that hid the creature. It was in bloom, the white and cream flowers lifted turgidly upward, waiting to catch the rain that would soon fall. There was the sharp tinkle of a breaking flower and cream slivers twisted and turned downward.

It wasn't imagination. Something *was* behind the tree.

Fawkes took a deep breath and dashed out, holding his blaster before him, nerving himself to shoot at the slightest sign of danger.

But a voice called out, "Don't. It's only I." A frightened, but definitely human face looked out from behind the tree.

It was Mark Annuncio.

Fawkes stopped in mid-stride and stared. Finally, he managed to croak, "What are you doing here?"

Mark said, staring at the blaster in the other's hand, "I was following you."

"Why?"

"To see what you would do. I was interested in what you might find. I thought if you saw me, you would send me away."

Fawkes became conscious of the weapon he was still holding and put it away. It took three tries to get it into the holster.

The first fat drops of rain began to fall. Fawkes said, harshly, "Don't

say anything about this to the others."

He glared hostilely at the youngster and they walked back to camp separately and in silence.

A central hall of pre-fab had been added to the seven tents now, and the group was together within it, sitting about the long table.

It was a great moment, but a rather subdued one. Vernadsky, who had cooked for himself in his college days, was in charge. He lifted the steaming stew off the short-wave heater and said, "Calories, anyone."

He ladled the stuff lavishly.

"It smells very good," said Novee, doubtfully.

He lifted a piece of meat with his fork. It was purplish and still felt tough despite internal heating. The shredded herbs that surrounded it seemed softer, but looked less edible.

"Well," said Vernadsky, "eat it. Put it in your mouth. I've tasted it and it's good."

He crammed his mouth and chewed. He kept on chewing. "Tough, but good."

Fawkes said, gloomily, "It'll probably kill us."

"Nuts," said Vernadsky. "The rats have been living on it for two weeks."

"Two weeks isn't much," said Novee.

Rodriguez said, "Well, one bite won't kill. Say, it *is* good."

And it was. They all agreed, eventually. So far, it seemed that whenever Junior's life could be eaten at all, it was good. The grains were almost impossible to grind into flour, but that done, a protein-high cake could be baked. There was some on the table now; dark and heavy. It wasn't bad, either.

Fawkes had studied the herb life on Junior and come to the conclusion that an acre of Junior's surface, properly seeded and watered, could support ten times the number of grazing animals that an acre of Earthly alfalfa could.

Sheffield had been impressed; spoke of Junior as the granary of a hundred worlds, but Fawkes dismissed his own statements with a shrug.

He said, "Sucker bait."

About a week earlier, the party had been agitated by the sudden refusal of the hamsters and white rats to touch certain new herbs Fawkes had brought in. Mixing small quantities with regular rations had resulted in the death of those that fed on it.

Solution?

Not quite. Vernadsky came in a few hours later and said, calmly, "Copper, lead, and mercury."

"What?" said Cimon.

"Those plants. They're high in heavy metals. Probably an evolutionary development to keep from being eaten."

"The first settlers—" began Cimon.

"No. That's impossible. Most of the plants are perfectly all right. Just these and no one would eat them."

"How do you know?"

"The rats didn't."

"They're just rats."

It was what Vernadsky was waiting for. He said, dramatically, "You may hail a modest martyr to science. I tasted the stuff."

"What?" yelled Novee.

"Just a lick. Don't worry. I'm the careful-type martyr. Anyway, the stuff is as bitter as strychnine. What do you expect? If a plant is going to fill itself with lead just to keep the animals off, what good does it do the plant to have the animal find out by dying after he's eaten it? A little bitter stuff in addition acts as a warning. The combination warning and punishment does the trick."

"Besides," said Novee, "it wasn't heavy metal poisoning that killed the settlers. The symptoms aren't right for it."

The rest knew the symptoms well enough. Some in lay terms and some in more technical language. Difficult and painful breathing that grew steadily worse. That's what it amounted to.

Fawkes put down his fork. "Look here, suppose this stuff contains some alkaloid that paralyzes the nerves that control the lung muscles."

"Rats have lung muscles," said Vernadsky. "It doesn't kill them."

"Maybe it's a cumulative thing."

"All right. All right. Any time your breathing gets painful, go back to ship rations and see if you improve. But no fair counting psychosomatics."

Sheffield grunted, "That's my job. Don't worry about it."

Fawkes drew a deep breath, then another. Glumly, he put another piece of meat into his mouth.

At one corner of the table, Mark Annuncio, eating more slowly than the rest, thought of Norris Vinograd's monograph on "Taste and Smell." Vinograd had made a taste-smell classification based on enzyme inhibition patterns within the taste buds. Annuncio did not know what that meant exactly but he remembered the symbols, their values, and the descriptive definitions.

While he placed the taste of the stew to three subclassifications, he finished his helping. His jaws ached faintly because of the difficult chewing.

Evening was approaching and Lagrange I was low in the sky. It had been a bright day, reasonably warm, and Boris Vernadsky felt pleased. He had made interesting measurements and his brilliantly colored sweater had showed fascinating changes from hour to hour as the suns' positions shifted.

Right now, his shadow was a long red thing, with the lowest third of it gray, where the Lagrange II shadow coincided. He held out one arm and it cast two shadows. There was a smeared orange one some fifteen feet away and a denser blue one in the same direction but only five feet away. If he had time, he could work out a

beautiful set of shadowgrams.

He was so pleased with the thought that he felt no resentment at seeing Mark Annuncio skirting his trail in the distance.

He put down his nucleometer and waved his hand. "Come here!"

The youngster approached diffidently. "Hello."

"Want something?"

"Just . . . just watching."

"Oh? Well, go ahead and watch. Do you know what I'm doing?"

Mark shook his head.

"This is a nucleometer," said Vernadsky. "You jab it into the ground like this. It's got a force-field generator at the top so it will penetrate any rock." He leaned on the nucleometer as he spoke, and it went two feet into the stony outcropping. "See?"

Mark's eyes shone, and Vernadsky felt pleased. The chemist said, "Along the sides of the uniped are microscopic atomic furnaces, each of which vaporizes about a million molecules or so in the surrounding rock and decomposes them into atoms. The atoms are then differentiated in terms of nuclear mass and charge and the results may be read off directly on the dials above. Do you follow all that?"

"I'm not sure. But it's a good thing to know."

Vernadsky smiled, and said, "We end up with figures on the different elements in the crust. It's pretty much the same on all oxygen/water planets."

Mark said, seriously, "The planet with the most silicon I know of is Lepta with 32.765 per cent. Earth is only 24.862. That's by weight."

Vernadsky's smile faded. He said, dryly, "You have the figures on all the planets, pal?"

"Oh, no. I couldn't. I don't think they've all been surveyed. Bischoon and Spenglow's 'Handbook of Planetary Crusts' only lists figures for twenty-one thousand eight hundred and fifty-four planets. I know all those, of course."

Vernadsky, with a definite feeling of deflation, said, "Now Junior has a more even distribution of elements than is usually met up with. Oxygen is low. So far my average is a lousy 42.113. So is silicon, with 22.722. The heavy metals are ten to a hundred times as concentrated as on Earth. That's not just a local phenomenon, either, since Junior's over-all density is five per cent higher than Earth's."

Vernadsky wasn't sure why he was telling the kid all this. Partly, he felt, because it was good to find someone who would listen. A man gets lonely and frustrated when there is no one of his own field to talk to.

He went on, beginning to relish the lecture. "On the other hand, the lighter elements are also better distributed. The ocean solids aren't predominantly sodium chloride as on Earth. Junior's oceans contain a respectable helping of magnesium salts. And take what they call the 'rare

lights.' Those are the elements lithium, beryllium, and boron. They're lighter than carbon, all of them, but they are of very rare occurrence on Earth, and in fact, on all planets. Junior, on the other hand, is quite rich in them. The three of them total almost four-tenths of a per cent of the crust as compared to about four-thousands on Earth."

Mark plucked at the other's sleeve. "Do you have a list of figures on all the elements? May I see?"

"I suppose so." He took a folded piece of paper out of his hip-pocket.

He grinned as Mark took the sheet and said, "Don't publish those figures before I do."

Mark glanced at them once and returned the paper.

"Are you through?" asked Vernadsky in surprise.

"Oh, yes," said Mark, thoughtfully, "I have it all." He turned on his heel and walked away with no word of parting.

The last glimmer of Lagrange I faded below the horizon.

Vernadsky gazed after Mark and shrugged. He plucked his nucleometer out of the ground, and followed after, walking back toward the tents.

Sheffield was moderately pleased. Mark had been doing better than expected. To be sure, he scarcely talked but that was not very serious. At least, he showed interest and didn't sulk. And he threw no tantrums.

Vernadsky was even telling Sheffield that last evening Mark had spoken to him quite normally, without raised voices on either side, about planetary crust analyses. Vernadsky had laughed a bit about it, saying that Mark knew the crust analyses of twenty thousand planets and some day he'd have the boy repeat them all just to see how long it would take.

Mark, himself, had made no mention of the matter. In fact, he had spent the morning sitting in his tent. Sheffield had looked in, seen him on his cot, staring at his feet, and had left him to himself.

What he really needed at the moment, Sheffield felt, was a bright idea for himself—a really bright one.

So far, everything had come to nothing—a whole month of everything. Rodriguez held fast against any infection. Vernadsky absolutely barred food poisoning. Novee shook his head with vehement negativeness at suggestions of disturbed metabolism. "Where's the evidence?" he kept saying.

What it amounted to was that every physical cause of death was eliminated on the strength of expert opinion. But men, women, and children had died. There must be a reason. Could it be psychological?

He had satirized the matter to Cimon for a purpose before they had come out here, but it was now time and more than time to be serious about it. Could the settlers have been

driven to suicide? Why? Humanity had colonized tens of thousands of planets without its having seriously affected mental stability. In fact, the suicide rate, as well as the incidence of psychoses, were higher on Earth than anywhere else in the galaxy.

Besides, the settlement had called frantically for medical help. They didn't want to die.

Personality disorders? Something peculiar to that one group? Enough to affect over a thousand people to the death. Unlikely. Besides, how could any evidence be uncovered. The settlement site had been ransacked for any films or records, even the most frivolous. Nothing. A century of dampness left nothing so fragile as purposeful records.

So he was working in a vacuum. He felt helpless. The others, at least, had data; something to chew on. He had nothing.

He found himself at Mark's tent again and looked inside automatically. It was empty. He looked about and spied Mark walking out of the camp and into the woods.

Sheffield cried out after him, "Mark! Wait for me!"

Mark stopped, made as though to go on, thought better of it, and let Sheffield's long legs consume the distance between them.

Sheffield said, "Where are you off to." (Even after running, it was unnecessary to pant in Junior's rich atmosphere.)

Mark's eyes were sullen, "To the air-coaster."

"Oh?"

"I haven't had a chance to look at it."

"Why, of course you've had a chance," said Sheffield. "You were watching Fawkes like a hawk on the trip over."

Mark scowled. "Everyone was around. I want to see it for myself."

Sheffield felt disturbed. The kid was angry. He'd better tag along and try to find out what was wrong. He said, "Come to think of it, I'd like to see the coaster myself. You don't mind having me along, do you?"

Mark hesitated. Then he said, "We-ell. If you want to." It wasn't exactly a gracious invitation.

Sheffield said, "What are you carrying, Mark?"

"Tree branch. I cut it off with the buzz-field gun. I'm taking it with me just in case anyone wants to stop me." He swung it so that it whistled through the thick air.

"Why should anyone want to stop you, Mark? I'd throw it away. It's hard and heavy. You could hurt someone."

Mark was striding on. "I'm not throwing it away."

Sheffield pondered briefly, then decided against a quarrel at the moment. It would be better to get to the basic reason for this hostility first. "All right," he said.

The air-coaster lay in a clearing,

its clear metal surface throwing back green highlights. (Lagrange II had not yet risen.)

Mark looked carefully about.

"There's no one in sight, Mark," said Sheffield.

They climbed aboard. It was a large coaster. It had carried seven men and the necessary supplies in only three trips.

Sheffield looked at its control panel with something quite close to awe. He said, "Imagine a botanist like Fawkes learning to run one of these things. It's so far outside his specialty."

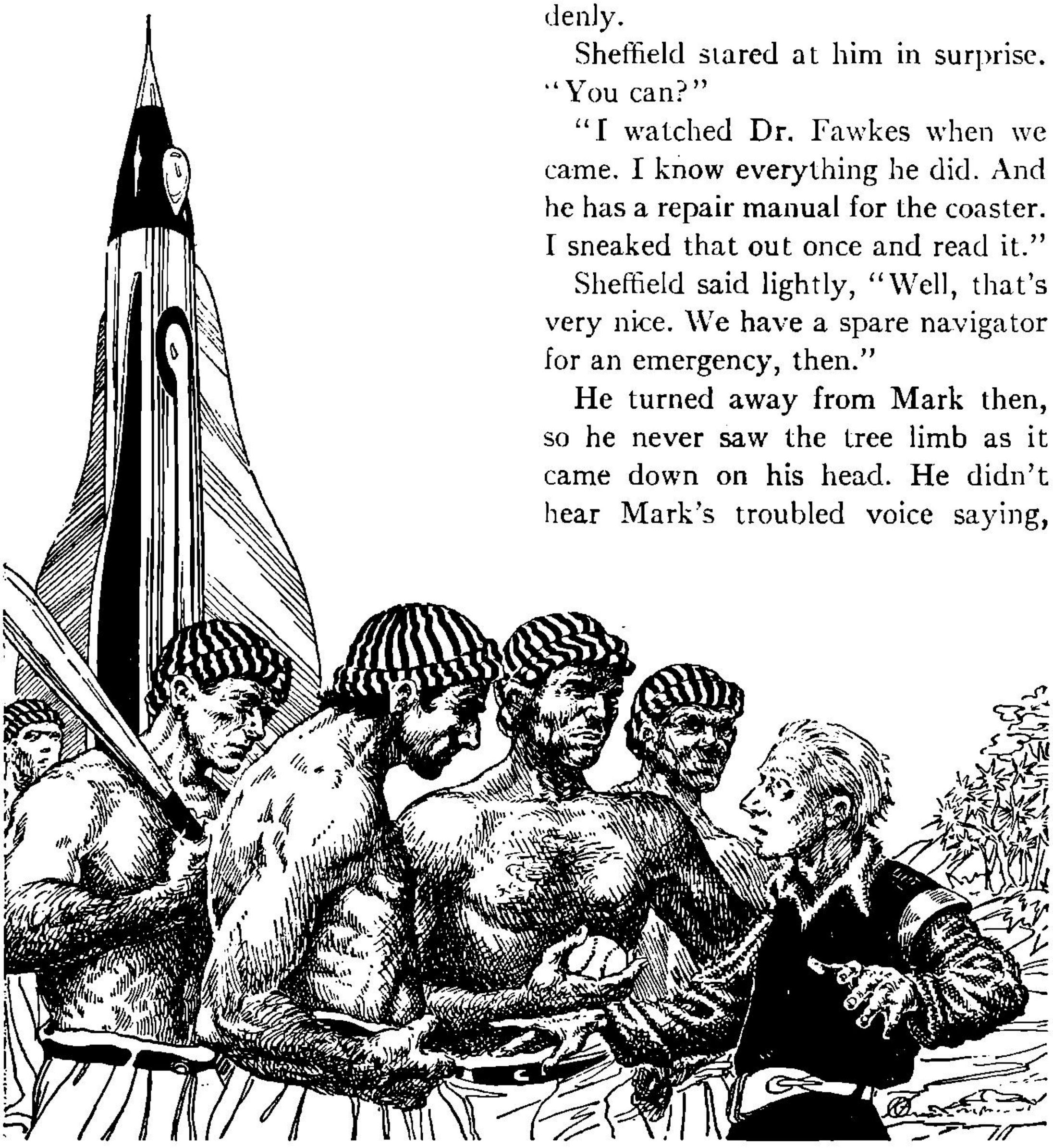
"I can run one," said Mark, suddenly.

Sheffield stared at him in surprise. "You can?"

"I watched Dr. Fawkes when we came. I know everything he did. And he has a repair manual for the coaster. I sneaked that out once and read it."

Sheffield said lightly, "Well, that's very nice. We have a spare navigator for an emergency, then."

He turned away from Mark then, so he never saw the tree limb as it came down on his head. He didn't hear Mark's troubled voice saying,



"I'm sorry, Dr. Sheffield." He didn't even, properly speaking, feel the concussion that knocked him out.

It was the jar of the coaster's landing, Sheffield later thought, that first brought consciousness back. It was a dim aching sort of thing that had no understanding in it at first.

The sound of Mark's voice was floating up to him. That was his first sensation. Then as he tried to roll over and get a knee beneath him, he could feel his head throbbing.

For a while, Mark's voice was only a collection of sounds that meant nothing to him. Then they began to coalesce into words. Finally, when his eyes fluttered open and light entered stabbingly so that he had to close them again, he could make out sentences. He remained where he was, head hanging, one quivering knee holding him up.

Mark was saying in a breathless, high-pitched voice, ". . . A thousand people all dead. Just graves. And nobody knows why."

There was a rumble Sheffield couldn't make out. A hoarse deep voice.

Then Mark again, "It's true. Why do you suppose all the scientists are aboard?"

Sheffield lifted achingly to his feet and rested against one wall. He put his hand to his head and it came away bloody. His hair was caked and matted with it. Groaning, he staggered toward the coaster's cabin door. He fumbled for the hook and yanked it inward.

The landing ramp had been lowered. For a moment, he stood there, swaying, afraid to trust his legs.

He had to take in everything by installments. Both suns were high in the sky and a thousand feet away, the giant steel cylinder of the *Triple G* reared its nose high above the runty trees that ringed it.

Mark was at the foot of the ramp, semicircled by members of the crew. The crewmen were stripped to the waist and browned nearly black in the ultraviolet of Lagrange I. (Thanks only to the thick atmosphere and the heavy ozone coating in the upper reaches for keeping UV down to a livable range.)

The crewman directly before Mark was leaning on a baseball bat. Another tossed a ball in the air and caught it. Many of the rest were wearing gloves.

"Funny," thought Sheffield, erratically, "Mark landed right in the middle of a ball park."

Mark looked up and saw him. He screamed, excitedly, "All right, ask him. Go ahead, ask him. Dr. Sheffield, wasn't there an expedition to this planet once and they all died mysteriously?"

Sheffield tried to say: Mark, what are you doing? He couldn't. When he opened his mouth only a moan came out.

The crewman with the bat said,

"Is this little gumboil telling the truth, mister?"

Sheffield held on to the railing with two perspiring hands. The crewman's face seemed to waver. The face had thick lips on it and small eyes buried under bristly eyebrows. It wavered very badly.

Then the ramp came up and whirled about his head. There was ground gripped in his hands suddenly and a cold ache on his cheekbone. He gave up the fight and let go of consciousness again.

He came awake less painfully the second time. He was in bed now and two misty faces leaned over him. A long, thin object passed across his line of vision and a voice, just heard above the humming in his ears, said, "He'll come to, now, Cimon."

Sheffield closed his eyes. Somehow he seemed to be aware of the fact that his skull was thoroughly bandaged.

He lay quietly for a minute, breathing deeply. When he opened his eyes again, the faces above him were clear. There was Novee's round face, a small, professionally-serious line between his eyes that cleared away when Sheffield said, "Hello, Novee."

The other man was Cimon, jaws set and angry, yet with a look of something like satisfaction in his eyes.

Sheffield said, "Where are we?"

Cimon said, coldly, "In space, Dr. Sheffield. Two days out in space."

"Two days out—" Sheffield's eyes widened and he tried to rise.

Novee interposed. "You've had a bad concussion, nearly a fracture, Sheffield. Take it easy."

"Well, what hap— Where's Mark? *Where's Mark?*"

"Easy. Easy now." Novee put a hand on each of Sheffield's shoulders and pressed him down.

Cimon said, "Your boy is in the brig. In case you want to know why, he deliberately caused mutiny on board ship, thus endangering the safety of five men. We were almost marooned at our temporary camp, because the crew wanted to leave immediately. He persuaded them, the captain did, to pick us up."

Sheffield remembered now, very vaguely. There was just that fuzzy memory of Mark and a man with a bat. Mark saying ". . . A thousand people all dead—"

The psychologist hitched himself up on one elbow with a tremendous effort. "Listen, Cimon, I don't know why Mark did it, but let me talk to him. I'll find out."

Cimon said, "No need of that. It will all come out at the trial."

Sheffield tried to brush Novee's restraining arm to one side. "But why make it formal? Why involve the Bureau? We can settle this among ourselves."

"That's exactly what we intend to do. The captain is empowered by the laws of space to preside over trials involving crimes and misdemeanors

in deep space."

"The captain. A trial here? On board ship? Cimon, don't let him do it. It will be murder."

"Not at all. It will be a fair and proper trial. I'm in full agreement with the captain. Discipline demands a trial."

Novee said, uneasily, "Look, Cimon, I wish you wouldn't. He's in no shape to take this."

"Too bad," said Cimon.

Sheffield said, "But you don't understand. I'm responsible for the boy."

"On the contrary, I do understand," said Cimon. "It's why we've been waiting for you to regain consciousness. You're standing trial with him."

"What!"

"You are generally responsible for his actions. Specifically, you were with him when he stole the air-coaster. The crew saw you at the coaster's cabin door while Mark was inciting mutiny."

"But he cracked my skull in order to take the coaster. Can't you see that's the act of a seriously disturbed mind. He can't be held responsible."

"We'll let the captain decide, Sheffield. You stay with him, Novee." He turned to go.

Sheffield called on what strength he could muster. "Cimon," he shouted, "you're doing this to get back at me for the lesson in psychology I taught you. You're a narrow . . . petty—"

He fell back on his pillow, breathless.

Cimon, from the door, said, "And by the way, Sheffield, the penalty for inciting mutiny on board ship is death!"

Well, it was a *kind* of trial, Sheffield thought grimly. Nobody was following accurate legal procedure, but then, the psychologist felt certain, no one knew the accurate legal procedure, least of all the captain.

They were using the large assembly room where, on ordinary cruises, the crew got together to watch subetheric broadcasts. At this time, the crew was rigidly excluded, though all the scientific personnel were present.

Captain Follenbee sat behind a desk just underneath the subetheric reception cube. Sheffield and Mark Annuncio sat by themselves at his left, faces toward him.

The captain was not at ease. He alternated between informal exchanges with the various "witnesses" and sudden super-judicial blasts against whispering among the spectators.

Sheffield and Mark, having met one another in the "courtroom" for the first time since the flight of the air-coaster, shook hands solemnly on the former's initiative. Mark had hung back at first, looking up briefly at the crisscross of tape still present on the shaven patch on Sheffield's skull.

"I'm sorry, Dr. Sheffield. I'm very sorry."

"It's all right, Mark. How have they been treating you?"

"All right, I guess."

The captain's voice boomed out, "No talking among the accused."

Sheffield retorted in a conversational tone, "Listen, captain, we haven't had lawyers. We haven't had time to prepare a case."

"No lawyers necessary," said the captain. "This isn't a court trial on Earth. Captain's investigation. Different thing. Just interested in facts, not legal fireworks. Proceedings can be reviewed back on Earth."

"And we can be dead by then," said Sheffield, hotly.

"Let's get on with it," said the captain, banging his desk with an aluminum T-wedge.

Cimon sat in the front row of the audience, smiling thinly. It was he that Sheffield watched most uneasily.

The smile never varied as witnesses were called upon to state that they had been informed that the crew was on no account to be told of the true nature of the trip; that Sheffield and Mark had been present when told. A mycologist testified to a conversation he had had with Sheffield which indicated the latter to be well aware of the prohibition.

It was brought out that Mark had been sick for most of the trip out to Junior, that he had behaved erratically after they had landed on Junior.

"How do you explain all that?" asked the captain.

From the audience, Cimon's calm voice suddenly sounded. "He was frightened. He was willing to do anything that would get him off the planet."

Sheffield sprang to his feet. "His remarks are out of order. He's not a witness."

The captain banged his T-wedge and said, "Sit down!"

The trial went on. A crew member was called in to testify that Mark had informed them of the first expedition and that Sheffield had stood by while that was done.

Sheffield cried, "I want to cross-examine!"

The captain said, "You'll get your chance later."

The crewman was shooed out.

Sheffield studied the audience. It seemed obvious that their sympathy was not entirely with the captain. He was psychologist enough to be able to wonder, even at this point, how many of them were secretly relieved at having left Junior, and actually grateful to Mark for having precipitated the matter as he did. Then, too, the obvious kangaroo nature of the court didn't sit well with them. Vernadsky was frowning darkly, while Novée stared at Cimon with obvious distaste.

It was Cimon who worried Sheffield. He, the psychologist felt, must have argued the captain into this and it was he who might insist on the extreme penalty. Sheffield was bitterly regretful of having punctured the

man's pathological vanity.

But what really puzzled Sheffield above all was Mark's attitude. He was showing no signs of spacesickness or of unease of any kind. He listened to everything closely but seemed moved by nothing. He acted as though nothing mundane concerned him at the moment; as though certain information he himself held made everything else of no account.

The captain banged his T-wedge and said, "I guess we have it all. Facts all clear. No argument. We can finish this."

Sheffield jumped up again, "Hold on. Aren't we getting our turn?"

"Quiet," ordered the captain.

"*You* keep quiet." Sheffield turned to the audience. "Listen, we haven't had a chance to defend ourselves. We haven't even had the right to cross-examine. Is that just?"

There was a murmur that buzzed up above the sound of the T-wedge.

Cimon said, coldly, "What's there to defend?"

"Maybe nothing," shouted back Sheffield, "in which case what have you to lose by hearing us? Or are you afraid we have considerable to defend?"

Individual calls from the audience were sounding now. "Let him talk!"

Cimon shrugged, "Go ahead."

The captain said, sullenly, "What do you want to do?"

Sheffield said, "Act as my own lawyer and call Mark Annuncio as my principal witness."

Mark stood up, calmly enough. Sheffield turned his chair to face the audience and motioned him down again.

Sheffield decided there was no use in trying to imitate the courtroom dramas he had watched on the sub-ether. Pompous questions on name and condition of past life would get nowhere. Better to be direct.

So he said, "Mark, did you know what would happen when you told the crew about the first expedition?"

"Yes, Dr. Sheffield."

"Why did you do it then?"

"Because it was important that we all get away from Junior without losing a minute. Telling the crew the truth was the fastest way of getting us off the planet."

Sheffield could feel the bad impression that answer made on the audience, but he could only follow his instinct. That, and his psychologist's decision that only special knowledge could make Mark or any Mnemonic so calm in the face of adversity. After all, special knowledge was their business.

He said, "Why was it important to leave Junior, Mark?"

Mark didn't flinch. He looked straight at the watching scientists. "Because I know what killed the first expedition, and it was only a question of time before it killed us. In fact, it may be too late already. We may be dying now. We may, every one of us,

be dead men."

Sheffield let the murmur from the audience well up and subside. Even the captain seemed shocked into T-wedge immobility while Cimon's smile grew quite faint.

For the moment, Sheffield was less concerned with Mark's "knowledge," whatever it was, than that he had acted independently on the basis of it. It had happened before. Mark had searched the ship's log on the basis of a theory of his own. Sheffield felt pure chagrin at not having probed that tendency to the uttermost then and there.

So his next question, asked in a grim enough voice, was, "Why didn't you consult me about this, Mark?"

Mark faltered a trifle. "You wouldn't have believed me. It's why I had to hit you to keep you from stopping me. None of them would have believed me. They all hated me."

"What makes you think they hated you?"

"Well, you remember about Dr. Rodriguez."

"That was quite a while ago. The others had no arguments with you."

"I could tell the way Dr. Cimon looked at me. And Dr. Fawkes wanted to shoot me with a blaster."

"What?" Sheffield whirled, forgetting in his own turn any formality due the trial. "Say, Fawkes, did you try to shoot him?"

Fawkes stood up, face crimson, as all turned to look at him. He said, "I was out in the woods and he came sneaking up on me. I thought it was an animal and took precautions. When I saw it was he, I put the blaster away."

Sheffield turned back to Mark, "Is that right?"

Mark turned sullen again, "Well—I asked Dr. Vernadsky to see some data he had collected and he told me not to publish it before he did. He tried to make out that I was dishonest."

"For the love of Earth, I was only joking," came a yell from the audience.

Sheffield said, hurriedly, "Very well, Mark, you didn't trust us and you felt you had to take action on your own. Now, Mark, let's get to the point. What did you think killed the first settlers?"

Mark said, "It might have killed the explorer, Makoyama, too, for all I know except that he died in a crash two months and three days after reporting on Junior, so we'll never know."

"All right, but what is it you're talking about?"

A hush fell over everyone.

Mark looked about and said, "The dust."

Sheffield said, "What do you mean?"

"The dust! The dust in the air. It has beryllium in it. Ask Dr. Vernadsky."

Vernadsky stood up and pushed his way forward. "What's this?"

"Sure," said Mark. "It was in the data you showed me. Beryllium was very high in the crust, so it must be in the dust in the air as well."

Sheffield said, "What if beryllium is there? Let me ask the questions, Vernadsky. Please."

"Beryllium poisoning, that's what. If you breathe beryllium dust, non-healing granulomata, whatever they are, form in the lungs. Anyway, it gets hard to breathe and then you die."

A new voice, quite agitated, joined the melee. "What are you talking about? You're no physician."

"I know that," said Mark, earnestly, "but I once read a very old book about poisons. It was so old, it was printed on actual sheets of paper. The library had some and I went through them, because it was such a novelty, you know."

"All right," said Novee, "what did you read? Can you tell me?"

Mark's chin lifted, "I can quote it. Word for word. 'A surprising variety of enzymatic reactions in the body are activated by any of a number of divalent metallic ions of similar ionic radius. Among these activators are magnesium, manganous, zinc, ferrous, cobaltous, and nickelous ions, as well as others. Against all of these, the beryllium ion, which has a similar charge and size, acts as an inhibitor. Beryllium, therefore, serves to derange a number of enzyme-catalyzed reactions. Since the lungs have, apparently, no way of excreting beryllium, diverse metabolic derangements causing serious illness and death can result from inhaling dust containing certain beryllium salts. Cases exist in which one known exposure has resulted in death. The onset of symptoms is insidious, being delayed sometimes for as long as three years after exposure. Prognosis is not good.' "

The captain leaned forward in agitation. "Novee, is he making sense?"

Novee said, "I don't know if he's right or not, but there's nothing absurd in what he's saying."

Sheffield said sharply, "You mean you don't know if beryllium is poisonous or not."

"No, I don't," said Novee.

"Isn't beryllium used for anything?" Sheffield turned to Vernadsky, "Is it?"

Vernadsky said in vast surprise. "No, it isn't. Damn it, I can't think of a single use. I tell you what, though. In the early days of atomic power, it was used in the primitive uranium piles as a neutron decelerator, along with other things like paraffin and graphite. I'm almost sure of that."

"It isn't used now, though?" asked Sheffield.

"No."

An electronics man said, quite suddenly, "I think beryllium-zinc coatings were used in the first fluorescent lights."

"No more, though?" asked Sheffield.

"No."

Sheffield said, "Well, then, listen, all of you. In the first place, anything Mark quotes is accurate. That's what the book said, if he says so. It's my opinion that beryllium *is* poisonous. In ordinary life it doesn't matter because the beryllium content of the soil is so low. When man concentrates beryllium to use in nuclear piles or in fluorescent lights or even in alloys, he comes across the toxicity and looks for substitutes.

"He finds substitutes, forgets about beryllium, and eventually forgets about its toxicity. And then we come across an unusual beryllium-rich planet like Junior and we can't figure out what hits us. It takes a Mnemonic to remember the old, forgotten data."

Cimon didn't seem to be listening. He said, in a low voice, "What does that mean, 'prognosis is not good'?"

Novee said, abstractedly, "It means that if you've got beryllium poisoning, you won't recover."

Cimon fell back in his chair, chewing his lip.

Novee said to Mark, "I suppose the symptoms of beryllium poisoning—"

Mark said at once, "I can give you the full list. I don't understand the words but—"

"Was one of them 'dyspnea'?"

"Yes."

Novee sighed and said, "I say that we get back to Earth as quickly as possible and get under medical investigation."

Cimon said, weakly, "But if we won't recover, what use is it?"

Novee said, "Medical science has advanced since the days of books printed on paper. Besides, we may not have received the toxic dose. The first settlers survived for over a year of continuous exposure. We've had only a month, thanks to Mark Annuncio's quick and drastic action."

Fawkes, miserably unhappy, yelled, "Captain, get us back to Earth."

It amounted to the end of the trial. Sheffield and Mark walked out among the first.

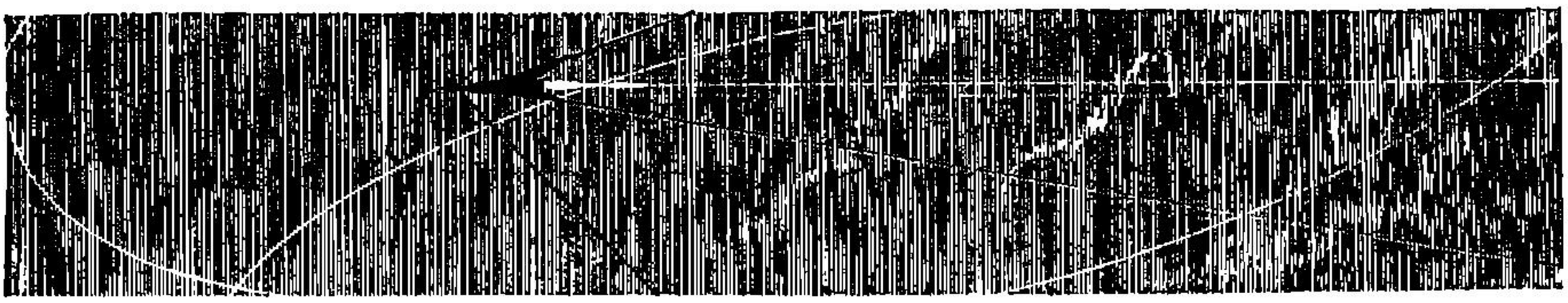
Cimon was the last, with the gait of a man already dead in all but fact.

The Lagrange system was only a star lost in the receding cluster.

Sheffield looked at that large patch of light and said, "So beautiful a planet." He sighed. "Well, let's hope we live. In any case, the government will watch out for beryllium-high planets in the future. There'll be no catching mankind with that particular variety of sucker bait any more."

Mark did not respond to that idealism. The trial was over; the excitement was gone. There were tears in his eyes. He could only think that he might die; and that if he did, there were so many things, so many, many things in the universe, that he would never learn.

THE END



SPACESUIT HELMET

Success is constructed bit by bit of ten thousand details. Successful research is constructed of detailed work, thinking of all the wrong answers you don't want that may show up anyway—and thinking of them before they've happened and killed someone.

The "fishglobe" spacesuit helmet is standard. Simple. No problem there . . .

The following is a verbatim release from the Public Information Office of the Headquarters Air Research and Development Command, at Baltimore:

Development of a new slotted helmet designed to protect pilots forced to bail out from their aircraft while traveling at supersonic speeds, was announced by the U. S. Air Force's Air Research and Development Command here (Baltimore).

Engineers of the Douglas Aircraft Company's Santa Monica Division, who designed and built the helmet, report the slots or vents which are cut into the forward crown section of the headgear greatly reduce wind shock and air lift and keep the helmet secure to the pilot's head.

The helmet has been successfully tested in an outdoor wind tunnel at simulated speeds up to Mach 1.04. At such speeds, approaching and exceeding the speed of sound, standard type helmets tend to be blown off. This would leave the escaping pilot without protection from supersonic wind blasts and—since the oxygen supply is attached to the helmet—without oxygen.

The need for this new helmet is an example of the many complex problems in adapting human pilots to modern high-speed, high altitude aircraft.

Douglas engineers, working in cooperation with the Air Research and Development Command, made wind tunnel tests on a standard flight helmet and G-suit. They found the air rammed into the front of the helmet

built up pressures inside that soon became greater than the strength of the fittings attaching the helmet to the pilot. This caused the helmet to be blown off. They also learned that under the air blast loads the G-suit tended to rip apart around the chest zipper seams.

To solve these problems, slots were cut into the helmet in the areas which showed up as negative pressure areas. This provided escape vents for the internal air pressure. Subsequent tests of the slotted helmet revealed that the slots not only serve as a means to let inside pressure escape but also create a partial vacuum which helps hold the helmet firmly in place.

The G-suit was modified by stitching a reinforcing nylon vest to the suit. The zipper was relocated from the chest to the back.

Both helmet and modified G-suit have since been tested, without damage of any kind, twice in stationary air blasts at simulated speeds exceeding Mach 1. They also have been actually ejected at speeds approaching Mach 1. In the ejection tests the new equipment was subject to air blasts from all directions.

In the present experimental stage each helmet must be designed and fitted to the individual pilot.

THE END

THE ANALYTICAL LABORATORY

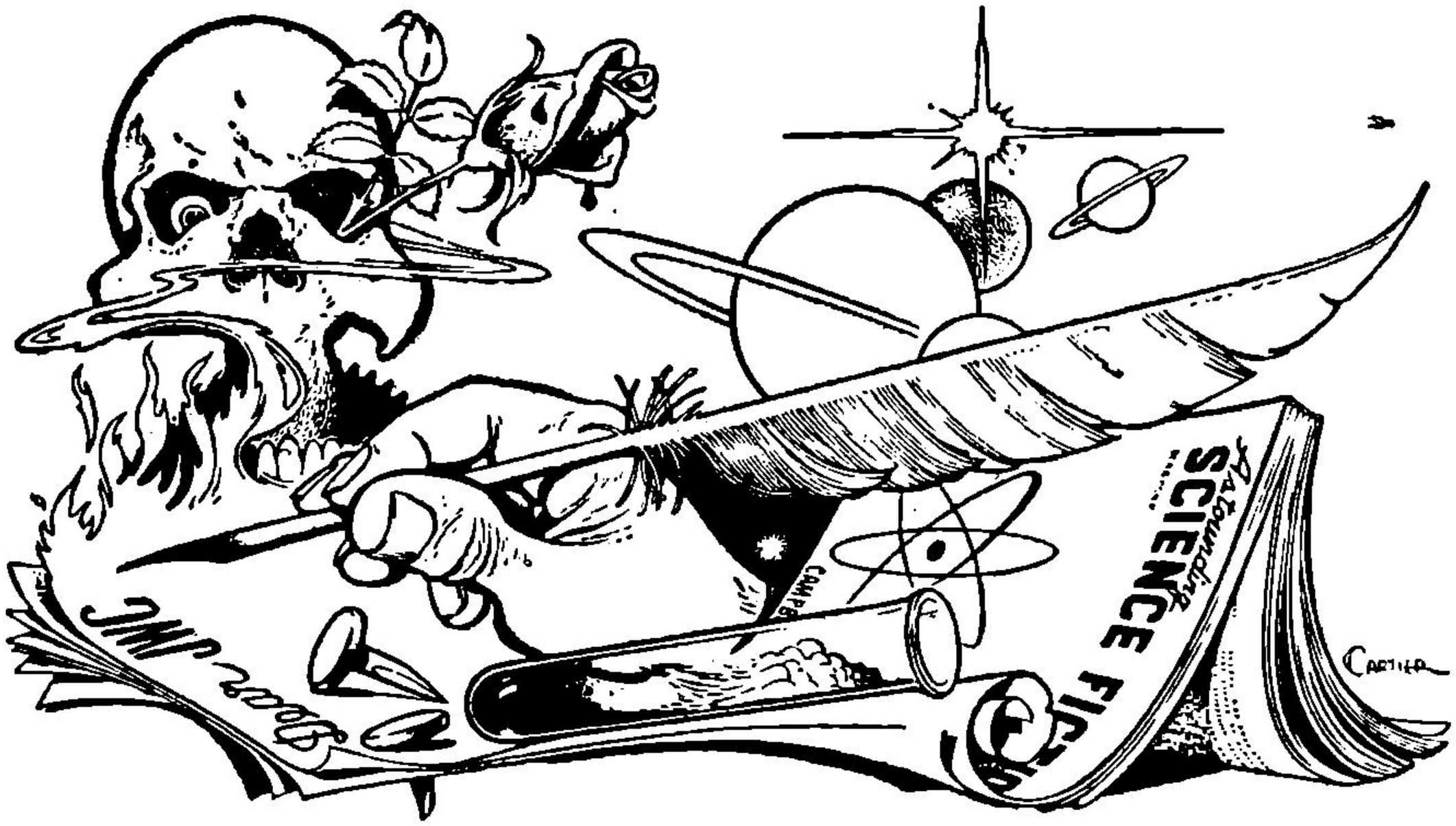
On the December issue the vote was somewhat light, but turned out somewhat generous. Maybe you readers were busy with Christmas shopping or something—but those of you who did vote were in a generous mood, so far as the authors were concerned! Offhand I don't recall another case of a tie for first place; this time it means two stories—and the two longest ones at that!—get the 4¢ bonus rate. The score stands:

Place	*Story*	*Author*	*Points*
1.	Hide! Hide! Witch!	Mark Clifton & Alex Apostolides	1.8
	Mother of Invention	Tom Godwin	1.8
2.	Counterspy	Kelley Edwards	3.02
3.	Ill Wind	Lee Correy	3.20

So not only did you give 'em a tie for first place, but you did it in an issue when the two novelettes were so exceptionally long that there were only four stories in the issue!

At any rate, it must have been a good issue!

THE EDITOR.



BRASS TACKS

Dear Mr. Campbell:

The 12th Annual World Science Fiction Convention will be held in San Francisco September 3, 4, 5, and 6, 1954.

Since we are still in the very early stages of planning and organization, we cannot, as yet, offer a concrete program. However, we can promise the following:

1. The hotel will be the Sir Francis Drake, one of the largest in the city. There will be no other conventions going on at the time, and the management has reserved four floors for the affair, with more if registrations warrant. Since we will be handling reservations directly, we will be able to keep the convention segmented.

2. We are planning a masquerade with live music, artwork for prizes, and probably refreshments, all on the house.

3. The annual banquet we guarantee will cost no more than $4/plate, and probably a lot less.

4. This will be one of the few four-day national conventions held. The first day will be devoted to the annual West Coast affair, the Westercon, with Jack Williamson as guest of honor. The following three days will comprise the national convention with John W. Campbell, Jr. as guest of honor.

Our committee is organized with one main idea in mind: we wish to make this convention the friendliest ever given. In light of that, this letter is a plea for early registrations and suggestions from interested fans. Dollar registrations and communications should be sent to Box 335, Station A, Richmond 2, California.—SAN FRANCISCO CONVENTION COMMITTEE, Les Cole.

There must be some of our readers who have been on professional society Convention Committees, and have learned things—the hard way—that Convention Committees need to know. I suspect Les Cole would appreciate your suggestions.

Dear Mr. Campbell:

I have been reading science fiction ever since some time in 1918 when I first encountered Jules Verne at the age of seven. Up till now I have never felt the spirit move me to get into the editorial column; however the recent frog-and-mouse battle between the Aristotelians and non-Aristotelians has me very much interested. I wish very much to be allowed to present my own two-bits worth.

In the first place, let it be pointed out that a categorical—i.e. Aristotelian—logic based on "'Tis" or "'Taint" is not sufficient for placing classical arithmetic on a firm footing. The reason being that in such a system, cardinal numbers must be defined as "Classes of Classes" which leads straight into Russell's Paradox. The Theory of Types being in disrepute, the paradox still holds. The Theory of Types is in disrepute because it rests upon the Axiom of Reducibility—in some form or other. This Axiom is equivalent to saying that a "Primitive Proposition" actually can be shown to exist. A primitive proposition is not a caveman's request for an *affaire d'amour*—it is a statement of fact which does not depend upon any previous and more fundamental statement of fact. Such a statement has yet to be made. But all of the statements in the Theory of Types depend upon the possibility that any real statement can be broken down to a finite collection of Primitive Propositions. So far, this possibility remains unfulfilled; Russell himself acknowledged this difficulty in "Principles of Mathematics," which volume is the preamble, so to speak, of the great "Principia Mathematica." This unhappy circumstance creates the first horn of the dilemma; discontinuity is untenable.

The other horn is just as firmly based; continuity is also untenable. Cantor showed that since we can't count all the real numbers, even with the Transfinite cardinal, Aleph-null, we must therefore have a continuum. Whereupon, Burali-Forti promptly rose up and demonstrated quite conclusively that if we *do* have a con-

tinuum, then there both *is* and *is not* a maximum Transfinite Ordinal. Various other people, Richard among them, discovered similar unpluggable holes in Cantor's theory.

So there is the dilemma; we both *must* have and *can't* have continuity. But as usual the dilemma exists only in our minds. If we are willing to accept a few very simple ideas, the paradoxes disappear because the things the paradoxes are talking about also disappear.

1. There is no such thing as an Infinite Class.

2. Continuity examined under strong enough magnification is discrete after all.

3. Any statement about a system of logic must be made from without the system of logic.

The above postulates commit us to the following immediate consequences:

Counting, measuring, in fact mathematics itself exists only in your brain and mine. The universe itself knows nothing of "two," "ten," "one-half," "pi," et cetera, which are nothing but high-degree abstractions from observed data. This business of forming "Classes of things" is also only our brainwork again. The "classes" do not exist independent of our thought any more than do "numbers" or other mathematical artifices. And an actual "Infinite" is an appealing but untenable abstraction from what we *seem* to observe and what we unconsciously read into the data from our thoughts *about* the data. Therefore, Continuity which depends for its existence upon the postulate of an infinite collection of entities (points) cannot exist, except as an illusion. We cannot *see* the grain in a good photograph, but sufficient magnification will show that it is there. (I seem to recall that you used this example yourself in the discussion at one time.) This should dissolve the paradoxes of the Infinite by the simple feat of denying the Infinite. And I cannot see that this does away with the calculus as some people seem to fear. Calculus depends upon the Continuity Theorem to be sure, but the very manner in which the Theorem is stated leaves us still in the clear: You name a short interval; I'll produce one still shorter out of the function in question. No matter how short you want to get I can make the function outdo you. By definition, then, the function is "continuous" in the interval we were working through. Now, nobody said a single word about an "infinite class," nor even raised the idea of its necessity. If you can make the function produce an interval smaller than the one you can detect, then you can apply Calculus to your problem.

As far as statement No. 3 is concerned, you can't discuss the self-consistency of a logic from within the framework of the logic itself, for if you do, you will quickly run into circular definitions or paradoxes or both. And this is where Godel gets

some of his "undecidable proposition" material from. One of the failings of the classical Aristotelian method lay in the inability to observe this. The foregoing sounds like the Theory of Types all over again, but it is not quite so. If we forego the attempt to place *all* logic and *all* mathematics upon a completely self-consistent basis, we will have no difficulty. We have long recognized that any branch of mathematics or logic needs a set of *postulates* and a set of operation *rules*. These *must* be imposed from *without*—a priori. Thus we should conclude that that logic is as self-consistent as we need at the moment. If we need to expand our view for any purpose, we can at any time step outside our immediate framework and set up a more inclusive logic than the one we just had. We never reach the end *and we should never expect to*. Non-Aristotelian logic does not *destroy* Aristotelian logic—it merely *includes* it.—John P. Fairfax, 1620 Howard Avenue, Burlingame, California.

We could also use a proposition to the effect that "It is irrational to be more logical than the nature of the situation permits." That concept might avoid a lot of human quarrels!

Dear Mr. Campbell:

Our English spelling is admittedly cumbersome. For the most part, it reflects 15th Century pronunciation, when the Great English Vowel Shift was still going on, and to make matters worse renders that pronunciation according to a hit or miss patchwork of phonetic systems worked out to fit Old French, Latin and Anglo-Saxon. But before we begin to tamper with it, we might well consider what has happened to Norwegian as the result of spelling reforms undertaken with more haste than speed.

Centuries of Danish rule had made Danish the *written* language of Norway before the two countries were separated in 1814. Since spoken Danish and spoken Norwegian are no farther apart than the extremes of British and American, and Danish spelling was more consistent than English to begin with, it was no harder for a Norwegian to write Danish and pronounce it in his own way than it is for us to write *through*, *night* and *either;* the chief thing to remember was that Danish *b*, *d* and *g* were pronounced *p*, *t* and *k* in Norwegian in certain combinations.

But in the 19th Century certain patriotic Norwegian writers evolved a new literary language based phonetically upon those dialects least like Danish, while other equally patriotic writers—Ibsen among them—clung to the old Dano-Norwegian of the towns and upper classes. The result was two literary languages, *Landsmål* and *Riksmål*, mutually quite intelligible even if their more devoted adherents were often scarcely on speaking terms.

Then, in 1907, the dam broke. In that year Dano-Norwegian—or Riksmål—took the first step towards an orthography which agreed more closely with Norwegian pronunciation. A spelling reform in Landsmål followed. But still no one was satisfied, and a whole series of spelling reforms since then has ended up in linguistic anarchy.

Everyone agrees that Norwegian should be written phonetically and even on the system of phonetics, but there agreement stops. Everyone insists that his particular class or regional dialect should be standard for the country, and it is a rare Norwegian hostess who can keep the dinner conversation to such uncontroversial subjects as religion, sex or politics instead of the orthography after the third *skål*. Even mathematicians go mad trying to figure the possible variations in spelling a simple Norwegian sentence like "The doctor slipped on a banana peel on his way to church." And, freed from the restraining influence of tradition, the Norwegian language has changed more since Ibsen than English has since Chaucer.

By all means, let's tackle the problem of English orthography. But first, let's make sure we know what we're doing. Festina lente. Hastverk er makkverk. Or, as Ben Franklin put it, MAKE HASTE SLOWLY.—Frank G. Nelson, 5473 E. 4th Street, Long Beach 14, California.

Which, I think, was the point beautifully made by Dolton Edward's in Meihem in ce Klasrum.

Dear Mr. Campbell:

A while ago I wrote you a somewhat impatient letter decrying your pro-Aristotelian editorials.

Mr. Howard W. Martin has taken my letter apart and shown me many ways to improve my presentation of an argument. I wish to thank him for pointing out my mistakes. It is easier for me to see the errors of others than to see my own, I will have to admit. However, I think it is far better to try to apply non-Aristotelian principles, no matter how ineptly, than to attempt to hinder this new and important aid to human progress. There are many others far more able to expound the principles of general semantics than I am, and I will leave any lengthy discussions up to them. I will only say this: the non-verbal elements of Korzybski's methodology appear to me to be the most important part. His system is essentially a personal orientation, and not a subject for debate or philosophical discussion.

Those who pass up the chance that is given them, of improving their mental processes, are the losers. There is evidence already from many fields, that those who accept and practice these principles find much of value.

In conclusion, I wish people would

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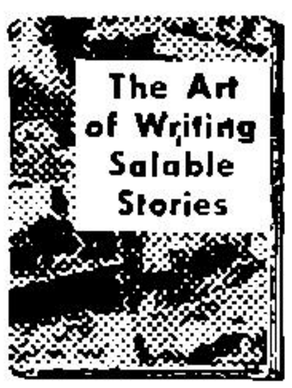

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recognize that *non*-Aristotelianism is not by any means *anti*-Aristotelianism. Instead, it is a broader, more general system which includes Aristotelianism as a special case. Also, although my first letter to you was no doubt as emotional, and unscientific as Mr. Martin pointed out, its function was intended to be persuasive. Korzybski himself would not object to projection, word magic, nor multi-ordinal uses of language as long as the author was aware of it. In the reality of daily living it is what we do that is important, not what we say. The opportunity to use non-A methods to make us more useful, happier citizens seems to me to be so valuable that I find it hard to conceive of its rejection by anyone who has taken any time to learn of its real nature.—G. J. Williamson, Foster Street, Philadelphia 14, Pennsylvania.

It would be fine indeed if logic of any or all kinds were sufficient to handle human problems! It's certainly necessary—but understanding seems to be broader than simple logics.

Dear Mr. Campbell:

After reading Dr. Gunther's "Logical Parallax" in the November '53 issue, a thought occurred to me about this topic.

As I understand it (I'm not too good at theoretical logic), the conflict he describes is one over which system of logic is the more accurate and more congruent with reality.

He describes Aristotelian logic as two-valued and non-Aristotelian logic as many-valued, and then goes on to show logically, how to use Aristotelian logic in a more than two-valued system (I think).

As I see it, the two-valued system is good for doing things with, and the many-valued system is good for thinking about things.

If you press a doorbell, the bell rings or it doesn't. You either ring the bell or you don't, there is no variance here from the two-valued system. However, it is in thinking about ringing the bell that the multivalued variables are used. Should I ring it or shouldn't I? They may be asleep, they may have company and I'd be intruding, they may not want to see me, the dog may bite me again.

When I take an action I do or I don't. When I think about something, I think in terms of the variables in the situation.

I think the difference lies in doing, deeds, actions, and occurrences, as contrasted with thought about them.

That's my idea, now what do you think about it? Is it right or wrong, or is it partially correct for an infinitesimally short period of time in 1954 AD?—David H. Milbauer, 100 Lefferts Avenue, Brooklyn 25, New York.

I agree!

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BY P. SCHUYLER MILLER

ONE MORE WORLD

Mars, as it nears another opposition, will be very much in the news these days and it is very fitting that a pair of books should have appeared within the last few months which give a pretty definitive answer to the questions: "What's there?" and "How do we check up?"

Both books come from university presses: they are "The Green and Red Planet," by Hubertus Strughold (University of New Mexico Press, Albuquerque, N. M. 1953. 109 pp. $4.00) and "The Mars Project," by Wernher von Braun (University of Illinois Press, Urbana, Ill. 91 pp. $3.95). Both, as you will note, are pretty expensive even by current book-making standards, but they are definitive studies of their respective fields. Strughold's book is subtitled "A Physiological Study of the Possibility of Life on Mars"; von Braun's is simply the step-by-step mathematical breakdown of his proposal to send a ten-ship fleet to explore the "green and red planet."

Dr. Strughold, now head of the Department of Space Medicine in the United States Air Force School of Aviation Medicine at Randolph Field, Texas, was formerly Associate Professor of Physiology at the Universities of Wuerzburg and Berlin, Director of the Aeromedical Research Institute

at Berlin, and Professor of Physiology at the University of Heidelberg. He has an M.D. as well as his Ph.D. The meat is his; the book has been edited by Green Peyton, formerly of *Time* and *Fortune*, and the journalistic touch occasionally obtrudes slightly.

Here in a nutshell is what we know about those conditions of the Martian climate which would affect life there, human and otherwise. The book deals only with "life as we know it"—and says so.

Since this is a physiologist's book, it begins with a summary of the factors on which our kind of life depends: the rather limited range of chemical composition, temperature, energy relations under which life occurs, and the way in which living creatures have adapted to these conditions. We learn, interestingly, that most creatures are more sensitive to an *oversupply* of a factor—heat, water, oxygen—than to its lack. This is especially true of temperature, and recent work lends weight to the possibility that simple life-forms can survive the cold of space, and be transported—as Arrhenius once suggested—from world to world, once the "accident of creation" has occurred.

Venus, it seems, spans more of the active-life zone of temperature than does even the Earth and only its chemistry prevents it from being the world of science-fictive tradition. (Dr. Heinz Haber has suggested that life can exist there as a kind of biological

aerosol, drifting in the atmosphere.) But Mars, bleak and unfriendly, is the only planet where life is probable.

At the surface of Mars the atmospheric pressure seems to be the equivalent of that at about eleven miles here on Earth. (Above this height the Martian atmosphere would have greater density than that of Earth, since the gravitational pull is less.) At this pressure fire will not burn.

The Martian temperature is subject to greater extremes than ours during the course of a day—in the tropics to ca. 85° F at noon, over the green areas, and to −95° at night—but the climate is more even, without our wild storms. Even so, there is not enough oxygen to support warm-blooded animals or any but the most primitive forms of life—such as lichens and mosses. By maintaining an *internal* atmosphere in cavities in their own tissues, these plants may maintain an oxygen content—from photosynthesis—three times that in the surrounding air.

With the sun down, this oxygen reserve would soon vanish. But here the "latent life" state which appears at low temperatures would help put the plant into dormancy: it would "noctivate."

The Martian atmosphere, then, may be *inside* its vegetation. Outside, men could not breathe even if the air were pure oxygen—the pressure is lower than the pressure of water vapor and CO_2 in the human lungs—but it has not fallen to the point where body fluids boil, so that explorers could breathe with masks or other mechanical aids. What fliers can do above fifty-six thousand feet here on Earth, they can do on the surface of Mars.

How they will get there is the subject of von Braun's thesis and present treatise, first publicized in the *Collier's* symposium and subsequent book and later detailed in the German "*Das Marsprojekt*" in 1952. This is a technical study, not a popular account, with some seemingly subversive statements in the introduction: "I believe it is time to explode once and for all the theory of the solitary space rocket and its little band of bold interplanetary adventurers. No such lonesome, extra-orbital thermos bottle will ever escape Earth's gravity and drift toward Mars."

To learn anything worth learning about Mars, or any planet, von Braun insists, requires a corps of specialists in a flotilla of spaceships—ten ships with not less than seventy men, in his present project. These ships will be built, fitted, fueled and manned in a two-hour orbit, 1,730 kilometers above the equator. This part of the work will be done by huge three-stage "ferry" rockets which use nearly 5,600 metric tons of hydrazine and nitric acid to life 39.4 tons of payload into the orbit.

Fueled, manned and ready, the Mars fleet takes off from its orbit in a low-acceleration powered hyperbola which gradually merges—under the

resultant force of the rockets and Earth's gravitational field—into the ellipse in which it will "coast" to Mars in two hundred sixty days. Here the Martian gravitation will pull out the ellipse into another hyperbola. Deceleration then warps this into another circular orbit around Mars, from which the explorers descend in small landing boats to spend some four hundred days on Dr. Strughold's "green and red planet." The return trip is made in another two hundred sixty days, leaving the three empty cargo vessels behind.

The ships which leave the Earth orbit weighing 3,720 metric tons will return nearly three years later weighing only 50.5 tons and with no more than 1.5 tons of "unassigned payload" in each of the seven ships for Martian souvenirs.

Every detail of this three-year voyage is worked out and shown in detail, down to the number of ferry flights—950—necessary to get the expedition started. Fuel cost for ferrying and round trip to Mars: only a little over half a billion dollars.

There is also a section on interplanetary radio communication which bears out what has already been reported here: it's perfectly feasible, with the limit for present equipment about the diameter of Pluto's orbit, using code. (Radio telephone would be good for about one hundred sixty days of the two-hundred-sixty-day Mars voyage; code for the rest.)

This is a handsome little book with too-wide margins—presumably intended for your notes—which don't help to keep the price down. I'd also have liked to see von Braun's drawings of the various ships—ferry, passenger, and space boats—on the inside as well as on a jacket which won't last a fraction of the time you'll keep the book. And if you disagree as to the need of a seventy-man expedition, and decide to make-do with one ship, here are the equations and figures with which you can work out the cost. I suppose the book is a "must" for all writers of science fiction; I wish it were less expensive.

AHEAD OF TIME, by Henry Kuttner. Ballantine Books, Inc., New York. 1953. 179 pp. $2.00; paper 35¢

Since the Kuttners have been busy with degree-earning at the University of Southern California, we have seen all too little of them in any guise (Lewis Padgett, or what have you—they own to nineteen names in all.) By now they should be back from a summer in Mexico with a suitcase full of manuscript.

"Ahead of Time," another of the Ballantine hardcover-softcover combinations, contains ten stories. Four appeared here back in 1942–1945; the rest have been published more recently in other magazines. And if they don't add up to a "great" collection, they are as good as any of the short-story collections now being published.

The four stories from ASTOUNDING SCIENCE FICTION are "Deadlock" (an invulnerable robot constructs a mysterious gadget which promptly destroys its maker), "Camouflage" (a transplanted brain duels with a gang of criminals seeking to take over the ship it controls), "Ghost" (electronic brains "catch" the insanity of a manic-depressive operator), and "Shock" (that story about the hole in the wall through which a man from the future crawls and sets out on a fantastic quest).

Incidentally, you might suppose Pohl and Kornbluth were among the Kuttner-Moore pen names, for certain of these stories show us much the same kind of world as that of the "Space Merchants"; "Deadlock," with its inter-industrial wars; and especially "Year Day," with its ultra-commercials.

The book opens with "Or Else," a story in which an extraplanetary policeman makes no impression whatsoever on the local culture-pattern. "Home Is the Hunter," shows us a culture of the coming century, in which the elite hunt each others' heads in Central Park. "By These Presents" is a fantasy or allegory — an outwitting-the-devil story — and so you may consider "Pile of Trouble," about those fantastic hillbillies, the Hogbens, who have lived forever and have all sorts of peculiar talents and powers.

This time they react on a small-town politician.

"De Profundis" is an unpleasant little tale which you can take as one of literal possession or insane hallucination. And that makes ten.

Why not follow my example on this: start with the paper-back, then if you want the book in your library, order the hardbound edition.

CHILDREN OF THE ATOM, by Wilmar H. Shiras. Gnome Press, New York. 1953. 216 pp. $2.75

"In Hiding" was recognized as one of the outstanding science fiction short stories of our time when it appeared here in 1948. "Opening Doors" was almost as good. "New Foundations" seemed to mark time. Now, with two further episodes in the career of the "Wonder Children," the stories are woven together into an on-going narrative.

If by any mischance you have missed "In Hiding," these are the stories of a group of children, mutants, who have gone into hiding as seemingly normal children to hide their own vast mental superiority. The first of them, Timothy Paul, is uncovered by a psychiatrist, Dr. Peter Welles, who then sets out to find and "rescue" the rest, and with a small group of colleagues and the children themselves sets up a kind of in-residence seminar in which the children can mature and round out their educations in their own way, at their own pace.

The new material which makes up the last third of the book carries on the story of the school, turns up some internal problems—not all the children are as well adjusted as young Timothy—and closes with a strange mixture of probable melodrama and a decision which is probably the only one such a group of gifted children could make to survive in our society.

"Children of the Atom" isn't up to that magnificent first passage, but it's a book you can recommend to non-fan friends as representative of the kind of thing science fiction does well.

THE BLACK STAR PASSES, by John W. Campbell, Jr. Fantasy Press, Reading. 1953. 254 pp. $3.00

So far as I know, no one has ever discussed the influence of the "Tom Swift" formula on early science fiction. I was fond of Tom myself, and I wasn't much past reading him with relish when John Campbell's first "Arcot-Wade-Morey" yarns began appearing—in 1930—in the four-year-old, middle-aged *Amazing Stories*. Here, slightly modernized to avoid too obvious anachronisms (there are no jet planes in 2126, however), are the first three adventures of the invincible three—and it's pure Tom Swift, crossed with "Skylark" Smith and liberally marmeladed with scientific patter.

Whereas Tom's inventions made some kind of sense to *Popular Mechanics* readers, these yarns seemed to make sense to people who had picked up some of the early patter of relativity, wave mechanics, quantum theory, and the "new" physics. It didn't matter whether Dick Arcot's or Robert Morey's inventions made sense—what counted was that they sure seemed to. And they were always evolved just in the nick of time!

To belie my Tom Swift analysis, Arcot and Morey, in "Piracy Preferred," not only capture an invisible pirate but have him psychoanalyzed into a third team-member. Tom and Ned Newton never even began to convert the skunk who kept making trouble for them. In "Solarite" the three use their key-invention, molecular transport, to get them to Venus, stop a planetary war in its tracks and convert both belligerent races into useful allies of Earth. Finally, in the title story, they all take on a mess of interstellar invaders.

This is old-fashioned fun which your editor no longer takes any more seriously than you need to. There was a sweep and reach and exuberance in those days, he points out in a fore-word, which seems to have gone out of science fiction now. Maybe this is a good place to start teen-agers who are ready to break away from "Captain Video" and the comics. There are two more books to come in the series, and as I recall Arcot, Wade and Morey got better as they went along.

YEAR'S BEST SCIENCE FICTION NOVELS: 1953, edited by Everett F. Bleiler & T. E. Dikty. Frederick Fell, Inc., New York. 1953. 315 pp. $3.50

Whether or not you agree that these are the best science-fiction "novels" (novelettes) of 1952, I doubt that

anyone can deny that a Bleiler-Dikty selection is well worth attention. It seems to me that they select for variety as much as "importance," literary elegance, or any other such self-conscious quality and as a result come up with some good stories too long to go in the ordinary short-story anthology.

Selections this year are William Tenn's "Firewater" from this magazine (the one about the gabbling derelicts who act as mental go-betweens for a race of Aliens), Murray Leinster's "The Gadget Had a Ghost," a time-entertainment from *Thrilling Wonder*, and three from *Galaxy*. These are Boyd Ellanby's "Category Phoenix"—how to keep the secret of immortality out of a dictator's hands—and my own favorites, James Blish's highly ingenious "Surface Tension," in which a microscopic human breed is seeded on a water-world and at last discovers "space," and Walter M. Miller, Jr.'s "Conditionally Human," a very human and moving story of humanity's relations with its not-quite-human surrogate children. Both of the latter two stories might be variations on a theme by Olaf Stapledon: I hope so, for there is a vast lode of untouched material there which can well be used as openly as writers have drawn on H. P. Lovecraft's artificial mythology.

There's still room—as the Twayne "triplets" have shown—for a *real* "best novels," about three to the volume.

THE ROBOT AND THE MAN, edited by Martin Greenberg. Gnome Press, New York. 1953. 251 pp. $2.95

None of Martin Greenberg's theme anthologies for Gnome has topped his first "Men Against the Stars," but this is far and away better than "Travelers of Space." What it lacks

most are some of the choice robot stories which have been used in other collections.

The theme hangs together very well, and there has been some whittling on the editor's part to make it do so, though without any evident damage to the stories—all that has been done is to make them consistent.

The opener, John D. MacDonald's "Mechanical Answer," shows the first conversion of a calculator into a reasoning machine. Bernard Wolfe's "Self Portrait," probably the best story in the book and *Galaxy's* lone entry, is a trial run for his novel, "Limbo," and much more readable as well as a three-dimensional portrait of a scientific heel. In it android musculature is achieved.

Lewis Padgett, with "Deadlock," shows one of the logical impasses of thinking humanoid robots, and H. H. Holmes in "Robinc" depicts the android-usuform conflict. Then we begin to get the robots-as-personalities: John S. Browning's chilling and tragic little "Burning Bright," A. E. van Vogt's fairly obvious but well done "Final Command" (for the decimation of robots—or of mankind), Lester del Rey's "Though Dreamers Die" (in which man and his robots are driven off Earth into the stars).

Finally, in Joseph E. Kellam's "Rust," the last of the lonely robots go, and Robert Moore Williams' "Robots Return" is converted into a sequel to "Though Dreamers Die," chronicling the rediscovery of Man by his machines. The collection ends with del Rey's "Into Thy Hands," as the robots recreate their organic masters.

VANDALS OF THE VOID, by Jack Vance; ROCKET TO LUNA, by Richard Marsten; MYSTERY OF THE THIRD MINE, by Robert W. Lowndes; THE MYSTERIOUS PLANET, by Kenneth Wright; BATTLE ON MERCURY, by Erik Van Lhin. John C. Winston Company, Philadelphia & Toronto. 1953. $2.00

This third quintet of Winston teen-age science-fiction novels is not up to the second and third groups. On the other hand, the only out-and-out lemon in fifteen books has been Hunter's "Find the Feathered Serpent," which seemed to go out of its way to pile inaccuracy on inaccuracy.

Jack Vance's experienced hand makes his otherwise routine yarn of a teen-ager who outwits pirates operating from a Moon base the best of the five. Richard Marsten's "Rocket to Luna" might be a prelude: an Air Force Academy cadet, through a series of rather implausible blunders, is taken along on the first rocket to the Moon, and, of course, redeems himself mightily.

Robert Lowndes, another experienced writer, gives us more melodrama among the miners of asteroids as a seemingly crooked "protection"

association shows all the signs of twentieth century racketeering.

In Erik Van Lhin's "Battle on Mercury" we have the only attempt to depict alien life—energy-creatures and silicone monsters—and a standard robot within the Solar System, but Kenneth Wright's "The Mysterious Planet" gives us invading superhumanoids from far space, with a traveling planet and invincible weapons.

These are still well in advance of the TV and comic-book version of science fiction for young people—and, let's admit it, a notch beyond some of the "adult" space-opera in current magazines, but there isn't the plausibility and realism of Clarke's "Islands in the Sky" or Latham's "Five Against Venus" from the earlier Winston Science Fiction library. These books tend toward the "rocket jockey" school of unlimited energy-resources which (I hope) adults can now take with tongue in cheek, but which make poor introductory stuff for the less sophisticated (or are those my joints you hear creaking?).

CONJURE WIFE, by Fritz Leiber. Twayne Publishers, New York. 1953. 154 pp. $2.75

This is the short novel of present-day sorcery in a college faculty which made history in *Unknown* back in 1943. It was the first and best third of Twayne's "Witches Three" last year; now it's reprinted as a separate volume.

There's a symbolic-logic twist to it that's reminiscent of the de Camp-Pratt adventures of Harold Shea, but this is by no means the rolic of that hapless soul. Seems to me the last quarter or third isn't up to the quiet tension of the opening, but it's one of those classics we talk about so glibly.

SPECIAL REVIEW

THE LIVING BRAIN, by W. Grey Walter. W. W. Norton and Co., New York. 311 pages. $3.95.

The science-fictioneer is a hopeful sort of character, seeking and finding pleasure in the exciting realms of What Might Be. Every so often, however, he likes to look back over his shoulder and see how close the more pedestrian scientists are to catching up with him. And once in a while he finds that the science-worker has gone ahead of him—on a slightly different tack, perhaps, but with Fact definitely leading Fantasy.

This book is an excellent example of how construction of robots is catching up with Robotics and electroencephalography is leading Mechanical Mind-Reading.

Dr. Walter—Sc.D., not M.D.—has written a book which is both urbane and exciting, sober and fun, informative and entertaining. He gives a short review of the evolution of the nervous system and how it developed into a system for keeping a stable internal environment. There is a history of the study of the brain, showing how progress in this field depended on increase in our knowledge of electricity and electronics. From this he plunges into the science of the electroencephalograph, the device which traces the compound rhythmical changes in potential between various parts of the brain. He omits the technical difficulties—but we can infer that they have been surmounted when he tells of how, by using a frequency analyzer, one can detect rhythmic voltage changes of one ten-millionth of a volt.

One of the more fascinating and thought-provoking topics is Walter's discussion of flicker—how, by flashing a stroboscopic light into a person's eyes five to forty times a second, one can produce emotional changes, hallucinations, changes in muscular tension, even full-blown epileptiform seizures. And when the flicker-frequency is synchronized with the brain-frequencies by means of feed-back circuits, nearly fifty per cent of "normal" people may have some sort of convulsion. The implications of this, the opportunities for use or abuse of this modality, open wide avenues for speculation—both in therapy and in science fiction.

And then Dr. Walter goes into a discussion of machines which demonstrate animallike behavior. He mentions Shannon's mechanical mouse, Ashby's homeostat and Berkeley's "Squee," as well as his own *Machina speculatrix*. He underlines the complex behavior-patterns which can result from the function of a few parts. For example, *M. speculatrix* has two receptors: a photoelectric cell and a micro-switch touch-receptor; two "nerve cells," each of which consists of a tube, a relay, a condenser and a battery; two effectors, one motor for driving the "animal" backwards and

forwards, the other for steering. And this comparatively simple "organism" manifests exploration, positive and negative phototropism, discernment, self-recognition, mutual recognition, internal stability and the function of seeking for optima.

With such complexity of behavior following from such simplicity of structure, is it any wonder that we humans, with our ten billion nerve cells, are sometimes erratic and unpredictable?

An important accomplishment in this book is that it again answers the question, "What is the use of making machines which imitate animals?" Or, in more familiar terminology, "O.K.—you've made a machine that works like an animal, so what?" In his answer, Dr. Walter follows the late great Kenneth Craik, who pointed out that the process called "understanding" is also the process of making manipulable models—the "models" being patterns of brain-waves, words, drawings, diagrams, mathematical formulae, scale-models, et cetera.

As a further bit of encouragement to the reader who would like to work in robotics, the wiring-diagrams for an electric model of a nerve, the design of *M. speculatrix* and the circuit for a conditioned-reflex analogue are included in the appendix.

One of the extras which we can get from reading science fiction is the impetus for finding out more about the subject from which the author takes off into the future. For example, there are a great many people who became interested in General Semantics as a result of reading "The World of Null-A"; interest in cybernetics has been fostered by casual S-F mentions of feed-back, servomechanisms, et cetera.

Perhaps you like to find out more factual information about robots, about the ways in which machines behave humanly and humans behave mechanically. If so, this book will help to quench your thirst for knowledge—and, it will also whet your appetite for more.

J. A. WINTER, M.D.

(*Continued from page 7*)

evidently does exist; let's call it *analogic*. Since I can't formulate either gestalt rationality, nor analogic rationality, I can't derive a sharp distinction between them, and show where the boundaries are such that they do not overlap. But that there are two distinct nonlogical rationalities I think can be shown.

When aeronautical engineers work with models in wind tunnels they have to do some very tricky mathematics, based on some rather largely empirical formulas called the Laws of Models. If you build a full-size fuselage and wing system having exactly the form of the model that tested successfully—you'll have a Grade A flop. The engineers are forced, by practical considerations, to experiment with models—which are *analogous* to the full-scale ship they want to build, but *not similar* to it. The full-scale ship will *not* work right if its form is *similar* in the sense the term "similar" is used in geometry—having the same angles and length-ratios.

In making the transformation of dimension ratios, the engineer is using *analogic;* he is reasoning by analogy, in one of the very few areas where analogical reasoning has been sufficiently formulated to be acceptable.

Any logician will throw out as not legitimate logic an effort to use reasoning by analogy; it has been held for many years that analogic reasoning is not logical reasoning. But *analogic is rational!* The Navy researchers towing test hulls in the Navy's tow tank depend on the rationality of analogic. In actual everyday living and thinking we must depend on analogic—yet we cannot defend our analogic in debate because there has never been an adequate formulation of the Laws of Analogic. This doesn't mean that no such laws exist; it simply means that we haven't found them yet.

Yet all science is, actually, based on the use of gestalt rationality and analogic rationality, far more than on logic, when the matter is investigated. Logic is the result finally achieved by the preliminary use of analogic and gestalt thinking.

Cosmologists are studying turbulence in a small laboratory pool of water in an effort to better understand the interactions of spiral nebulae. They find that galaxies collide, sometimes, and show *viscous* characteristics. How can that be? If we could formulate analogic, we could study better the pool of water, the swirl of gas in a near-vacuum, the eddy-in-space that is an atom.

Stellar mechanics has been greatly helped by the study of a large pool of mercury metal in a strong magnetic field. But if we just knew the Laws of Analogic, we could do a lot better.

Logic is only one of the methods of rational thinking!

THE EDITOR.

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—Continued from Back Cover

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—Continued on Inside Cover