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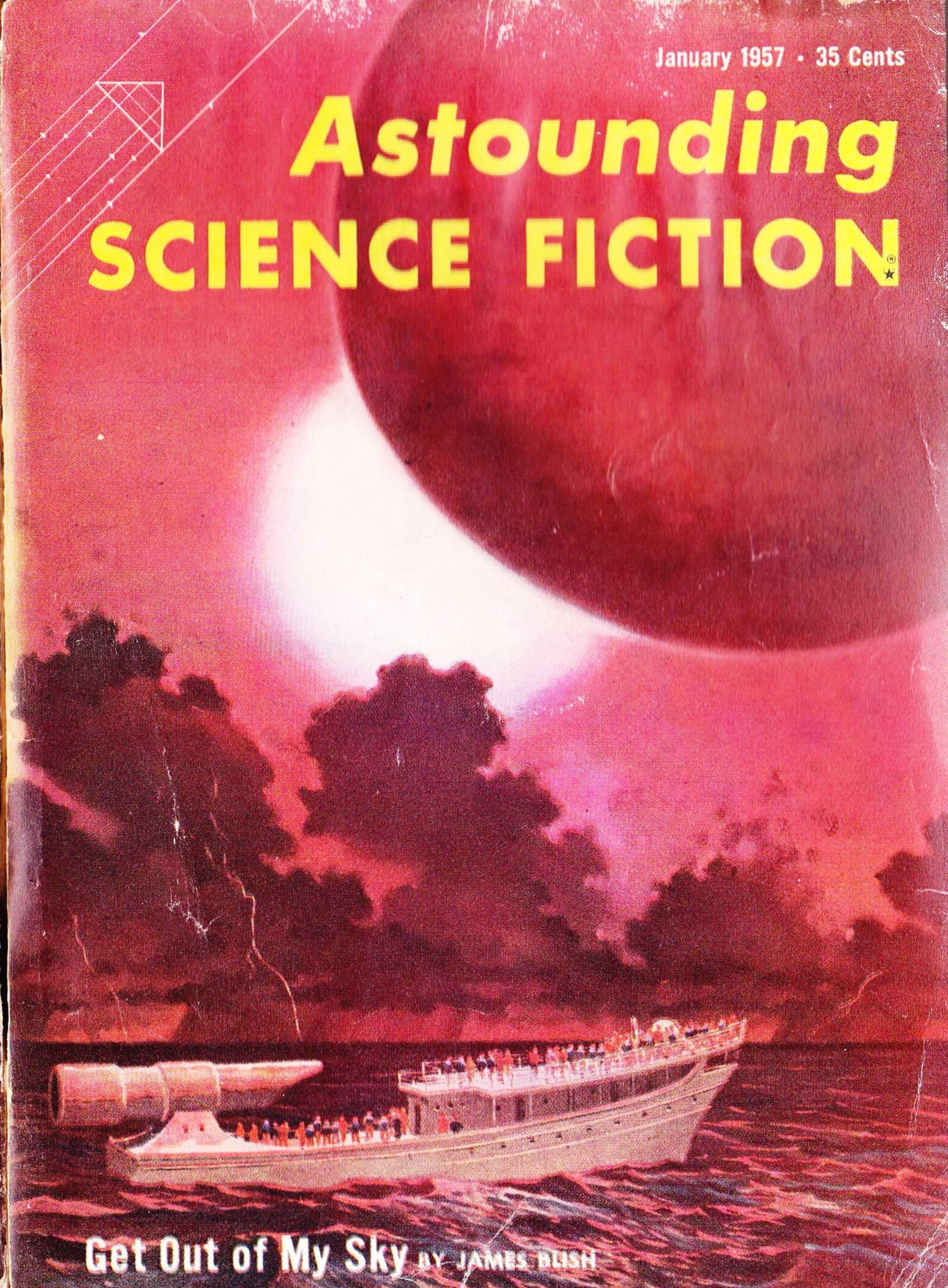

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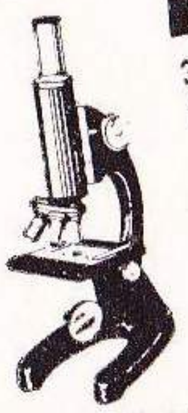

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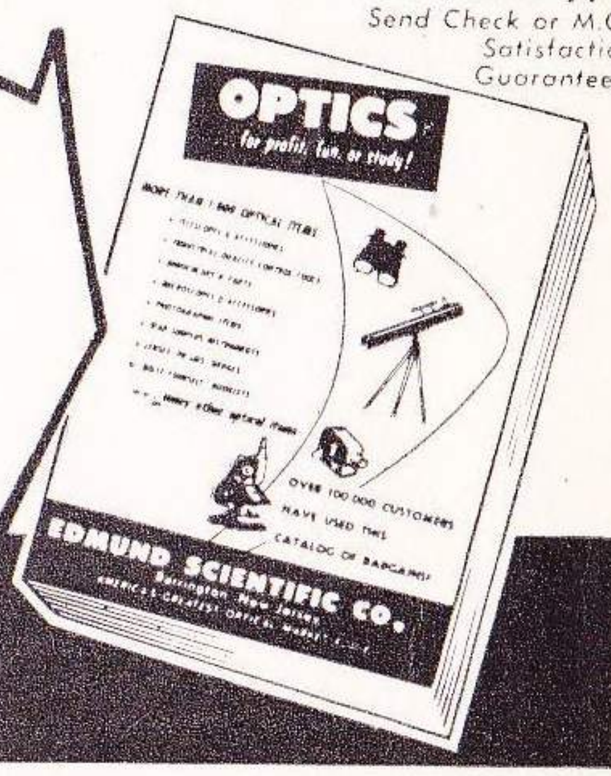

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SYMBOL: Transparent opacity: in which a perfectly transparent prism transmits no light.

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ITORIAL

THE ONE-EYED LOGICIAN

Einstein's remarkable work was so enormously fruitful of practical results that it is exceedingly easy to forget what his work actually—by his original definition—was. Relativity is not, was not, and was not intended to be a descriptive discussion of what the Universe really is; it was specifically defined as a description of what an observer, with the specified characteristics, would see in the Universe-of-reality.

It was intended to be, and was, a highly cogent and accurate description of how the Universe-of-reality would *appear* to an observer having the characteristics of the Ideal Logical Observer.

The difference between what the Ideal Logical Observer would appear to see, and what is there to be seen, is enormous, and unfortunately easy to overlook. It happens that the Ideal Logical Observer could be described as "a one-eyed logician suffering from extreme tunnel vision." Also, he's dependent entirely on electromagnetic sensory devices, and all his senses alike suffer from extreme tunnel vision. Einstein's Ideal Observer can detect the coincidence of a pointer and a mark—but nothing else.

That is, of course, the inherent characteristic of logic; it is a process of going from one point to another along a line of argument. It's strictly, absolutely and exclusively a linear process.

"Logic" as I am using the term here refers to the rigid, strict scientific-mathematical logic; not the decidedly sloppy and loose term we use to apply to that which we, as individuals, consider rational thinking. In formal logic, you can have only one point at a time; two at once would be labeled *inconsistency* and be rejected.

From that characteristic of formal logic, it immediately follows that the Ideal Logical Observer can't detect simultaneity; if he did detect it, he would be forced to reject it because that would constitute holding two non-identical and non-equivalent points to be valid simultaneously—which is inconsistent in Logic.

The logical observer, therefore, can't possibly detect or admit the validity of simultaneity; even if it existed as a fact in the Universe, the One-Eyed Logician cannot admit that fact.

The One-Eyed Logician cannot detect patterns, either, unless they can be expressed entirely in linear-sequence form. Result: the modern television system is a perfect One-Eyed Logician. It *never* presents a picture; it presents a complexly folded line of argument, along which a point of varying intensity moves. If the announcer smiles and waves his hand simultaneously, the TV system cannot possibly present that; your human eye and brain integrate the report of the One-Eyed Logician in a non-logical manner, and recognize the fact of a picture in which several things are happening simultaneously.

The One-Eyed Logician effect is enormously encouraged by the nature of the metering devices that we have available. The typical voltmeter presents a radius line—the needle—which intersects with an arc—the scale. The result can be read by a one-eyed logician; the intersection of two lines is a point.

In some aircraft landing instruments, two-meter movements are so mounted that their indicating needles intersect—visually—to present a point of data.

But repeatedly, the data-yielding systems are made to yield *points* that can be used in a line of argument.

Einstein did not say that inertia and gravity were the same; he pointed out that a tunnel-blind logician couldn't observe any difference. The latter statement is provably valid; Einstein didn't even suggest that the former was valid.

That Einstein's work was a tremendously valuable achievement no one needs to defend today. The danger is that, to an enormous extent, the exact, defined nature of that work, which Einstein himself very specifically stated, can be so forgotten as to lead to the acceptance of the invalid proposition "This is a description of the Universe-of-reality," instead of the accurate proposition Einstein stated.

Notice the situation arising in a comparable case: I can make an accurate description of precisely what will be observed by a box camera, fitted with a fixed simple meniscus lens of 6-inch focal length, with an F 11 aperature, and a fixed exposure setting of 1/25th of a second, loaded with a simple silver-halide emulsion film.

The definition of the lens is so poor that the circle of confusion of star-images will give a very low image-intensity. If the film has a speed rating of 20, very few stars will record. Since the simple silver-halide emulsion is blue-sensitive only, an intense red and an intense yellow will both record as black. The low film speed, and the small aperture means that, at 5 PM, on

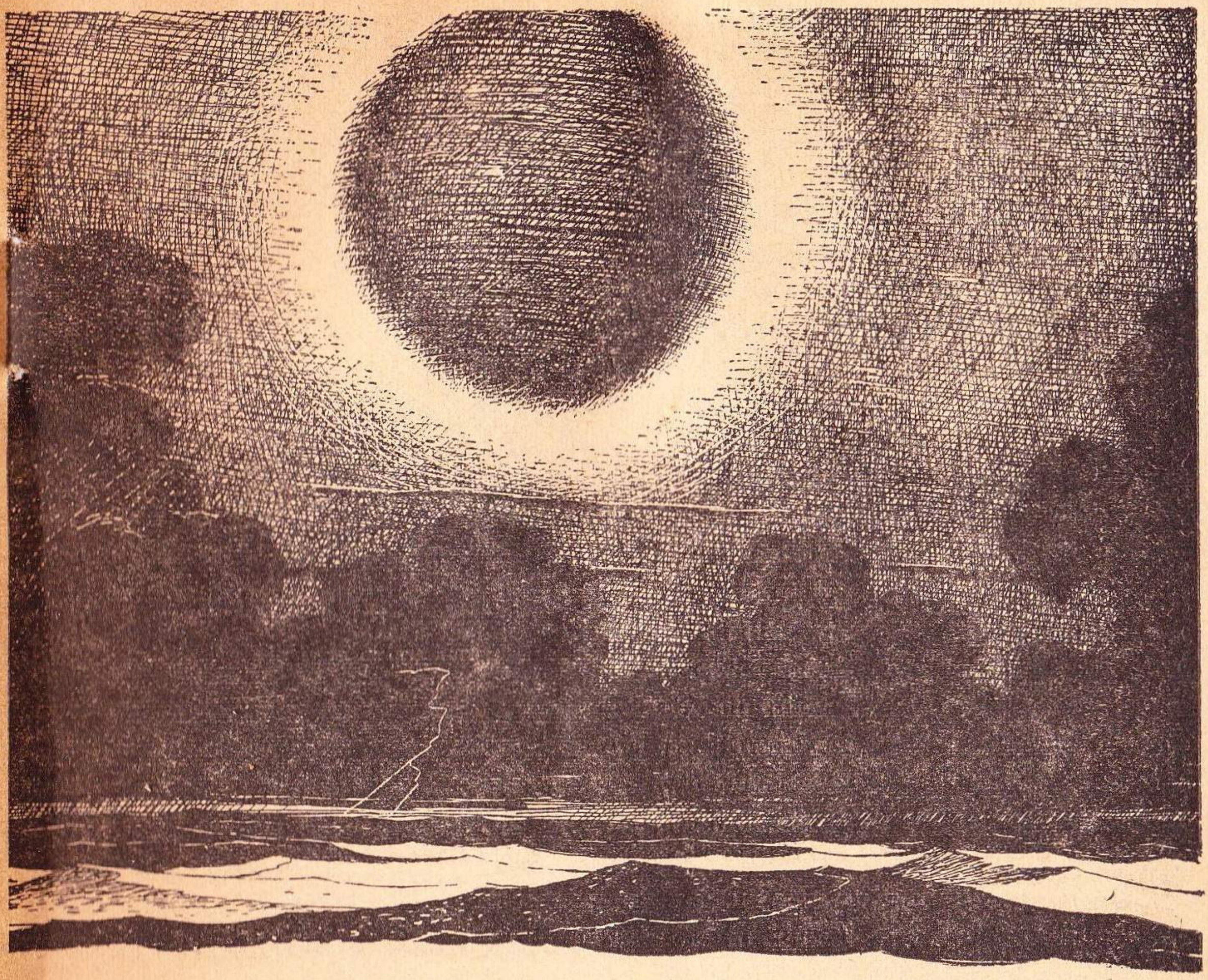
(*Continued on page* 160)

GET OUT OF MY SKY

First of Two Parts. ***The nature of a world inevitably shapes the character of its people—and a world of small islands in vast seas makès an insular dissident people....***

BY JAMES BLISH

Illustrated by van Dongen



It was like a kind of dance, with the sighs and shouts and drumming feet of the crowd for music. The little figure on the platform, far away at the center of the huge pavilion, moved from one edge of the boards to another with desperation, his legs moving loosely, his arms flapping, the white blur of his face turned appealingly to the tented sky and then to the swaying audience.

The young couple at the back could hear his voice, but not what he was saying. Only the wavering sound of someone shouting penetrated this far through the sea-roar of the crowd. They looked at each other apprehensively. They had debated whether or not to come to this meeting, and others like it, for a long time. They loved the man on the platform, and they had not, at first, wanted to see him doing what he was doing now—dancing and pleading before a packed mass of overwrought humanity, saying things that nobody but those in the front row could hear with any accuracy,

yet which somehow moved the entire mass.

In the end a morbid curiosity had won, and here they were, listening—but to what? Just a moment ago, the man had fallen on his knees at one border of the stage and held out his arms; a great groan of orgiastic sorrow was spreading from the people closest to that side of the platform, beating its way outward through the pavilion in a wave of contagion. It was still coming like a foaming comber toward the young couple when the man on the platform was on his feet again, striding toward the great central pole which held the tent's pyramidal vault in place. He shook his fist at it, and then at the sky. After a moment's hesitation—which compelled instant silence in the center of the audience, a silence which was itself audible out here at the roaring periphery (like, the young man thought incongruously, the hole in a doughnut)—he rushed on to seize the ridgepole itself, in what was apparently an insane effort to wrestle the immense duralumin mast bodily out of the ground.

The whole crowd was on its feet in an instant, screaming. Fists were being shaken aloft everywhere. A chanting began near the center of the tent and was rocking the entire enclosure within five seconds.

Get out of our sky! Get out of our sky! Get out of our sky!

The young couple were standing and shouting with the rest, though the words filled them with terror. The whole world of Home tipped and reeled to the rhythm of that massive chant. There was no questioning it. It was the reason why the universe existed. It was the purest of transports, a vast exultation of hatred.

Get out of our sky! Get out—

On the stage, the little figure clutched at the mast and turned slowly, looking out at the roaring mass of voices and fists. His face was blank, except for a small black O where his mouth should have been. The words of the chant seemed to drive him back like blows, until he was standing only with the greatest effort. The mast that he had been attacking only a moment ago was now his sole support, and it seemed that in a moment even that would fail him. Not that he would lose his grip and fall—no; but that the mast itself would break before he would, and as he stood clinging to the stub, the whole vast pavilion would come down in smothering square miles of stiff brocade, bringing the heavens with it. It was not holding him up. He was holding it up.

The chant began to falter. The man's head was resting against the ridgepole, rocking a little as though every shout was a slap. His whole body was doing a dance of torture, and yet at the same time it did not seem to be moving. A horrified Ahhhhh! *rose into the middle of the chant and broke its rhythm; it*

died away rapidly. In the silence, someone began to weep.

The young couple sat down, clinging to each other. They had not yet heard one intelligible word from the man on the platform, but he had already wrung them dry—a man that each of them had known intimately since childhood, yet now a man that neither of them had ever seen before. He straightened himself against the ridgepole with great effort, and the pole seemed to stiffen with him. He came forward with slow painful steps, lifted his faraway face—and looked directly into their eyes.

In the intent hush, his familiar voice came soaring to them, as though it had been meant for no one else.

"Children," he said. "Children of the cities who have come to the tent; children of the fields and jungles who have come to the tent; children of the seas and nations who have come to the tent; children of the world, children of Home who have come to this tent, listen! There is still time."

The young man and his bride tightened their grips upon each other's hands; they were frozen to their seats. Though the man on the platform had once been as close to them as blood can tie, he was now something else—and more than a man.

"There is still time," he said. "Here is where we and the grass grow up like music."

The congregation listened.

I

The sea at red noon glared and glided from the hull of the recon cruiser to the horizon on every side. The red sun looked directly down on the deck from the zenith, coloring everything but each man's immediate shadow, the one of the three that the ancients had called the Soul. It made it seem as though the cruiser were forging through a fog of blood.

The second shadow, the Mind, stretched out along the deck, very blurred along the edges. It was being cast by the glittering mass of starfire at the northern horizon—the great cluster of stars of which this whole system was a marginal member. The third shadow, the Breath, was as usual sharper but dimmer than the Mind, for the white sun which cast it, now thirty degrees above the horizon in the west, was less brilliant than the star cluster. Both, like the soul and everything else, were tinged by the red sun.

And in a moment, the Breath would die. The white sun was about to go out.

The recon boat continued to skim over the sea, the jet engine mounted over its stern howling despite its ring-mounted silencer. The weather was clear, although a black line along the western horizon indicated that it might not stay clear for long. There was, of course, no land in sight. The sea on this side of the world, the side that faced toward the twin planet of Rathe, was emp-

ty except for a few insignificant atolls—a whoie hemisphere of desert, rolling water.

On Rathe, the emissary Margent had said, they had been looking down on that vast unbroken sea with dry throats for millennia. Rathe was mostly sand.

Aidregh looked up into the flaming sky again, but there was no sign of Rathe now. The air seemed as empty of the twin planet as it was in fact on the other side of Aidregh's world. But it was up there, all right —a planet seven thousand miles in diameter, almost exactly the same size as this one, and only two hundred fifty thousand miles away. The two planets revolved around a common center, which in turn trailed behind the red sun in the same orbit at a distance of sixty degrees, all three traveling around the white sun —the Trojan relationship so common in planetary systems, though it had only recently been understood.

Rathe was there, all right. It was invisible now only because it was approaching one of its semiannual total eclipses of the white sun, the eclipse that the recon craft had traveled so far from home to watch.

Aidregh had seen Rathe earlier in the trip; the first time he had seen it directly, and the memory was still capable of provoking the most powerful, the most bafflingly complex and ambiguous emotions. It did not matter, really, that he could not see the planet now. There was nothing he had to do but watch the team from his home continent of Thrennen setting up their instruments for the eclipse. As first minister of Thrennen, the largest of all the land-masses and, he hoped, the most powerful, almost his every waking thought these days dealt with Rathe in one way or another. But now, while he was actually under the brow of that far-too-close planet, he was largely useless.

How had the sight of Rathe impressed the very first mariners to cross the meridian between the occupied hemisphere and this one? Of course in a sense every explorer to cross that imaginary boundary line had been the "first" up to a century ago, since none of them up to then had come back; each new expedition had started with better equipment than the last, but in essentially the same ignorance. They all had expected to find some landfall on the other side of the world; it took a long time to discover that there was nothing there but nearly unbroken water.

The uniform disappearance of all the sailors had given the antipodes an evil name. The invention of the turbine had finally made a Great Circle crossing of the sea possible, but for a while no one had volunteered to try it. No one until Clian.

That had been an epic voyage. Clian had gone out from the harbor of Drash, Thrennen's major port, with a fleet of four crude turbo-powered hulks and some equally crude orders: to bring back pearls, capture a demon or two, and estab-

lish the latitude and longitude of the Isle of the Dead. It had been a venture typical of its era in its mixture of daring, engineering, and sheer superstition; a great age, on the whole, and one that Aidregh sometimes wished he had lived in.

Clian had come back with nothing. Nothing but decimated, half-starved crews, a tale of an ocean without one island to break its storm-rolling surface—

. . . *And a stone to rest upon the neck of the world, forever after.*

Every school child knew that part of his log verbatim. It ran:

Wherefor the further wee went onne—our victual descreasing, and the muggie vapors breed'g grate faintnesse—mor hourlie rose ther out of the sea a Licht such as nonne hadde seen ever befor; till—for wee were now in one hundred thirty-five degrees—ther stood reveal'd above the rimme of the water a marvelle as large as the white sonne, though not so bricht, ne mor brilliante than the red. And now were wee al becalm'd, so that wee did drift to and fro, and I order'd the turbine-wheels be fir'd; but even ere this was done, wee saw with grate wonder that you crescented globe moved not in the skye sithen wee moved, remain'g otherways hung silent above the waters. And as wee moved again, mor violentlie than befor because of our need, so arose this marvelle mor quicklie in the skye, as tho' it were pois'd eternallie o'er some spotte magickal upon the waters.

Now wee hadde most need of crafte and art, didde both slip mor slylie from us; for that the schippes of captain Dro and captain Fieze hadde spent alle theyre provisionnes; so as wee wer brought into despaire and discomfortte, hadde wee not pleaded with alle the compagnie it was butt one dayes werke mor to touch some strande, wher alle our wants and woes would be reliev'd; yet if wee return'd to Drash, then should wee be greeted with contumilie, didde wee not starve bie the waye; thus wee hadde grate fortune in maintain'g our travelles.

Yet alway as wee cross'd that sea didde the crescented globe rise o'er our heddes, chang'g in'ts aspeckles fourteen dayes longe, and vanish'g an other fourteen, but alle wayes o'er that same spotte magickal whene'er wee might descrie it. And of alle its appearancies, was its colour moste gloumie, in that it chaung'd from redde to argent continuallie, and was alle of blud-colour ere it didde vanish. . . .

The howling of the jet dropped abruptly and died, breaking into Aidregh's reverie. The recon craft lost speed, falling away from its nose-high planing on its hull-step, back into cruising position. They were approaching the path of totality. The sea looked the same as ever, but the astronomers were settling almost grimly to their instruments, with an occasional apprehensive side-

glance at the developing storm in the west.

Almost as if in mimicry of the recon craft, a squid almost a foot long broke through the oily surface of the water, its two webbed tentacles stretched tautly into glistening air-foils, discharging its jet. Seconds later, a dolphin leaped furiously after it, but fell short. A second leap was closer, but the squid, its jet exhausted now, banked to the right sharply and continued to glide; the dolphin's next leap was far off course. The squid continued to glide for nearly a hundred yards before it fell back into the water—and even that might not prove to be far enough, for dolphins travel in schools.

"Useless, isn't it?"

Aidregh started and turned, and then had to fight down an impulse to bare his teeth. There was nothing in Signath's appearance, he reminded himself, to inspire any revulsion. The Opposition party's tribune had a jaw which jutted no more and no less than that of most Thrennen men, or those of the other continent of Noone, for that matter; he had six fingers on each hand like everybody else, including the usual two thumbs; if one took his sandals off, he would be found to have neither more nor less vestigial webbing between his toes than Aidregh or his son Aidresne—or Corlant, his prospective daughter-in-law. Compared to the men of Rathe, whose foggy images Aidregh had been looking at for nearly a year now via television, Signath would have to be accounted a beauty.

Unfortunately, he was also mad, in Aidregh's considered opinion.

"No, don't think it's useless," Aidregh said carefully. "The more we know about the geography of Rathe, the better. And we've never had a chance to photograph it before in the special lighting of an eclipse."

"Photographs!" Signath said. "In my opinion, we ought to stop photographing and start acting. We know there's going to be war between them and us sooner or later. You can appease them just so long, Aidregh. Why give them the chance to strike the first blow?"

"They don't seem disposed to strike any blows at all," Aidregh said. "And it would be just as well *not* to start shaking our fists at them while your party is cutting the guts out of our military budget."

"You're soft on them, that's all. They don't understand any language but force. It was you that got us into this alliance with Noone in the first place, and now you've been talking to those Rathemen so long that you've begun to think like they do. We'll put a stop to it when we get control, you can be sure of that."

"Well, we couldn't very well treat with Rathe if the Noonemen were pulling against us," Aidregh began. But he no longer expected it to penetrate. The part of the populace that Signath's party represented had no use for that kind of

reasoning; it would be impolitic for Signath to pay any attention to it, whatever impression it made on him personally. "Look," Aidregh said instead. "We really know very little about Rathe yet. Isn't it sensible to reserve judgment until we have more facts? And to do our best in the meantime to get the facts?"

No, that wasn't going to work either. Why was it that reservation of judgment, the strongest of all arguments, always sounded like the weakest? And how did you make it prevail against hotheads like Signath?

But Signath was already looking up. He had forgotten Aidregh completely. His teeth were slightly bared, and the shadows on his face were shifting very gradually, turning it prominence by prominence into the phantom of a skull, as though the darkness were penetrating his taut flesh and transforming it into a vapor. On the deck, his Breath-shadow blurred beside Aidregh's.

The eclipse was beginning. It would last more than an hour.

The solid black edge of Rathe cut its way steadily into the white glare of the primary sun. The now-resting recon craft sidled this way and that in the quiet waves, its deck held in the horizontal plane by the thin and distant hum of its gyroscopes. The instruments snouted skyward with inhumanly still watchfulness.

Steadily, Rathe spread its darkness over the sea. Aidregh found that despite himself he was gulping for air.

At totality, the white sun was gone except for its far-flung atmosphere, and Rathe was illuminated brilliantly on one side by the glare of the star cluster, more faintly on the other by the red sun. Between the two layers of light was a thin, spindle-shaped band of absolute blackness. The instruments began to click, nibbling with invisible mandibles at the world in the sky.

Aidregh shaded and strained his eyes, but somehow the suddenly revealed planet looked less real to him than it had seemed on the photographs. The parti-colored pattern was partly responsible; it destroyed the illusion of roundness. In addition, the brightness of the sky, and of the white sun's pearly, shimmering corona, made it impossible to pick out fine details on Rathe itself.

There was nothing to see on the planet by the naked eye but the usual white, leprous patches of desert. There were a few oases and isthmuses of green in the quarter-sphere lit by the star cluster. In the area lit by the red sun there was a bright pinpoint of light—could that be a city? No; it was the reflection of the red sun from Rathe's one known small body of water, that is, the only body of water on *this* side of Rathe.

The whole planet was surrounded by still another bright ring which was Rathe's shallow atmosphere, transmitting the light of the white sun so fiercely as to make Rathe's actual perimeter impossible to see. Aidregh wondered how the instru-

ments could possibly mask out that glare, but the astronomers presumably had already anticipated it. Just after the moment of totality, the whole of Rathe was consumed in the bright glare, as if in the attempt to devour the white sun it had itself been devoured instead.

Is that a prophecy? Aidregh thought. And, if it is, does it apply to Rathe—or to us?

A low rumble rolled over the craft from the west. The storm was getting closer.

II

The recon craft volplaned back toward the line as though pursued by the demons Clian had been sent out to capture. The scientists had all disappeared into their respective darkrooms and cubbies. Most of the diplomatic observers and tribunes were making small talk in the gangways, trying to evade each other's watchfulness long enough to sneak below for some first crumb of new information. The one man who had succeeded in ducking below decks thus far had been almost literally blown back up the ladder, on the updraft of an indignant roar about fogged plates.

Aidregh, who had been dealing with scientists almost daily since he had been given his minister's portfolio, knew well enough that nothing coherent was likely to emerge from the new data for at least several days. Even thereafter it would be a breach of security to discuss the new findings. Thrennen and Noone were still not above trying to jockey for position among the smaller island nations and the Archipelago, even with Rathe hanging above both their heads, even after centuries of inter-island warfare.

As for Aidregh, he had made up his mind not to look at a single film or figure until he was back in his office. There were too many Thrennen tribunes like Signath who were waiting to catch him in some small act which might be for the good of the whole planet, instead of good for Thrennen and to the Isle with foreigners.

And if Signath were given enough rope, he might himself be caught breaching security—and good riddance. It had been his party, after all, that had attached the gyves of those same security regulations to every possible diplomatic contact with Rathe.

Instead, Aidregh went aft to the cabin of Dr. Ni, the physician attached to the expedition, an old friend—and soon-to-be relative, through the marriage of their children. The man was a paradox whose mysteries had always provided a welcome relief from the constant grinding of Aidregh's official cares: erudite far beyond the boundaries of his specialty, especially in history, yet curiously detached toward the momentous age in which he was actually living; hardly past middle age, yet obviously a man of wide experience in all of human living,

seemingly already to the point of boredom; a naval officer, but one who regarded all the armed services with the attitude he might have shown toward an especially elaborate game.

Thus Aidregh was not much surprised to find him out of uniform, swinging comfortably in his hammock reading a book. He could not possibly have been on deck during the eclipse, as had every other able-bodied man off duty.

"Hello, Aidregh. Come in; have a drink."

"Thanks. Obviously you've been here quite a while. What kept you away from the eclipse?"

Dr. Ni grinned and held up the book. Aidregh could just make out the title: it was the "Medani Balads," a volume the physician must have read twenty times over; he could quote from it verbatim, and often did.

"I don't understand you," Aidregh said. "I should think that you of all people would have at least a little curiosity about it—as a scientific man as well as an amateur of history."

"I've seen it once before," Dr. Ni said, performing at the same time the difficult trick of shrugging gracefully in a hammock. "As a nonspecialist, I could hardly expect to learn anything new from a second look. Besides, Aidregh, sciences differ. There's no more reason why I should be interested in an eclipse than that the astronomical boys should be fascinated by agglutinogens."

"Surely there's more to it than that. Rathe isn't just a light in the sky, it's a whole inhabited world—and one that may hold your life in its hand."

"When a man mixes his metaphors that freely," Dr. Ni said, grinning again, "I'm inclined to doubt that he's thinking very straight. And for that matter, Aidregh, you hold my life in your hand too, don't you? Which menaces me more—a planet a quarter of a million miles away, or a First Minister of Thrennen with his head in a muddle?"

"All right, Ni, suppose you tell me what I ought to be thinking. I don't pretend that I've got more than a marginal understanding of how to deal with Rathe, or what all the implications are—and how the Opposition howls for my head when I don't snap up their easy answers! All I know is that we'll die if the matter isn't handled absolutely flawlessly. Margent isn't giving away any figures, but he's made no secret of the fact that his people have a *large* supply of fission bombs all ready to dump on us if it ever comes to war. I'll listen to advice from anybody—literally anybody."

"My compliments to you, too," Ni said wryly. "I suppose I had that coming. Frankly, Aidregh, I think it *is* going to come to war, and I don't think you can do any more to prevent it than I can. Maybe you

can postpone it a little, where I couldn't even do that much. Even so, I wouldn't give you a fish for the life-span of the next generation."

"That's Corlant you're talking about, you know."

"I'm talking about my daughter," Ni said, unruffled, "and your son, and the whole population of this planet. The discovery of Rathe came either too soon or too late for us, Aidregh. For survival's sake, we should either have discovered it back in prehistory somewhere, so we'd be used to its presence by now, or several centuries in the future, when—I say this doubtfully—we'd be more rational."

"You sound rational enough to me," Aidregh said gloomily.

"That doesn't mean a thing. There are large numbers of rational men in Thrennen, and Noone too, otherwise we couldn't have made the alliance, shaky though it seems to be. But it's the popular feeling that's going to decide the matter in the end—and you know what that is."

The old, old depression began to flood back upon Aidregh full force. He knew. He had himself felt a faint thread of that superstitious horror back there on deck, while he had watched the Breath-shadow destroyed by the thing in the sky.

"They think that Rathe has no business being up there in *their* sky," he said. "And it means nothing to them that less than one per cent of them will ever see Rathe at all. Or that all this expanse of ocean

might just as well not be here at all, for all the difference it makes in their lives."

"Since it's no good to them, they're determined that it shall do them evil," Ni said. "That's about the way it goes. We're in a scientific age, more or less, Aidregh, but it takes a situation like this to reveal how few people actually are living in it, with their minds as well as their bodies. Do you know that in Clian's time, the percentage of people who believed in astrology was *smaller* than it is now? Nine out of every ten patients I have won't step out on the street when Rathe is occulting their birth constellation, or lining up with some of the outer planets in some stupid configuration or other. And most of the time, the astrologer they consult is giving them just any old figures at all—*he* knows that they won't be able to check on the actual position of Rathe at that time. He knows that they wouldn't check it if the planet were right over their heads, let alone being on the other side of the world all the time!"

Aidregh said nothing. Nine out of ten! And most of Ni's patients were high brass, and/or civilian government officials. Of course the figure was probably somewhat exaggerated, but still . . .

"I'll tell you a dilly," Ni added conversationally. "You know the new planet that was discovered last year—the fifth one, counting our pair as one—that colossal gas giant, I've forgotten its name. Well, the astrologers have decided that it controls the monorail lines! And it does no good to ask what it was controlling before there were any monorail lines; it hadn't been discovered then, so it didn't exist. And yet the thing's one hundred ten thousand miles in diameter, and one of its moons is as big as the whole planet of Nesmet —the so-called War Planet! Wait'll the boys get to work on that satellite, *then* we'll see some champion rationalizations. It may turn out to have been influencing popular dancing all this time!"

The planet Ni was talking about was Herak, of course. It was eight billion five hundred million miles from the white sun, had fourteen satellites at last reports, had an orbital period of two hundred sixty-five years . . . The figures fell into place automatically. To be First Minister these days required an extensive knowledge of descriptive astronomy—a knowledge that had to be kept concealed from the public, because it might lead people to think that spaceflight to the other planets was nearer than they had been led to believe, and that might make them wonder which planet was being visited, and that might lead them to conclude that naturally it would be the nearest one except Rathe, and that might lead them to think that there was an expedition on Nesmet right now, and the word might get back to Rathe, somehow . . .

And right at the moment, the

Nesmet expedition was overdue, which meant that it would be eighty-one days before Nesmet would again be in a position which would allow a take-off for home.

Officially, the first manned spaceflight was yet to be made. The public knew only that an orbital satellite had been successfully put into position six years ago, for the ostensible purpose of serving as a television relay station. Informed amateurs had immediately concluded that no such station was needed for the short distances over which television had to operate on the island continents, and correctly assumed that the satellite was there to communicate with Rathe. There had been an Isle of a stink about that; it had been quieted only by the government's assurance that the station was also *watching* Rathe, a never-sleeping sentinel and scout.

Since that series of guesses had hit home, no further word had been said about spaceflight except that Progress was Being Made. The succeeding events had been even more frightening in their possibilities for sensation. There had been, for instance, the unmanned missile which had been supposed to circle Rathe, take pictures, and come home again. Margent had reported, quite politely, that the Rathemen had shot it down. Furthermore, Margent had added in moderate tones, anything that approached Rathe henceforth would have to give advance warning, and would not be allowed to return home before landing at a designated spot on Rathe for inspection.

In short—although Margent did not say so—the Rathemen knew that the terrain on the other side of Rathe had always been invisible to the sister planet, and they meant to protect that invisibility for a while. Shortly thereafter, Aidregh's own world had had a similar visitor, and had sent a similar message back. Attempts by both sides to send missiles outside the range of detection, or at least of feasible anti-missile action, apparently had come to identical bad ends; at least Aidregh knew that there was still no picture of the far side of Rathe in *his* files. What pictures were in Margent's files could only be guessed, but Aidregh was reasonably sure that if any existed, they were all pretty bad. The weather on his own wet world wasn't as cooperative to cameras as was the clear desert air of Rathe.

If only the Nesmet expedition hadn't been forced to keep radio silence—

He looked up with a start of embarrassment. Dr. Ni had resumed reading his book, but he put it down again at Aidregh's movement.

"I expect," he said, "something brilliant in response, after all that cogitation."

"I'm sorry, Ni. I got sidetracked. I don't even remember what you said last. I'm not very good company these days, I'm afraid."

"I don't mind being quiet while a man thinks. But you need practice at thinking about something else.

You're worrying yourself into hysteria. Don't deny it—I'm a doctor, I can see the signs. Got any hobbies, Aidregh?"

"Hobbies? Oh, I guess Aidresne is about the only hobby I—"

"No, no," Dr. Ni said, frowning. "You're not the man to be relaxed by your family. Aidresne's a fine boy, but I mean some interest you don't *worry* about. Do you like music?"

"I'm tune-deaf, I'm afraid."

"I wish our schools recognized that as a serious physical handicap, as serious as being minus a leg, and gave compensating training; but they don't, so that's that. How about reading? Like this?" He waved the "Medani Ballads."

"I haven't much time for reading. Of course in school I—"

"Oh, school. Poetry is for adults, not children. Here, try this."

He riffled through the volume for a brief moment, and then read:

"Hopeful of poetry, the near-
sighted heart
Puts to the moment's pain a
burning-glass;
The soft bruise bleeds, and
mourns fatality,
Weeping, This shall not pass.

"Weeping is bitter, but tragedy
in tears
Lies taut and salty on the drying
cheek.
The past is sand. Beside the clock
Even the heart is weak.

"Quietly the ducts of pain are
emptied,
Frayed in converse with the smil-
ing shears.
There is no rain but rain, nor
better
Aegis than the umbrella of the
years."

"It's . . . interesting," Aidregh said hesitantly. "I'm not sure I understood it all. He says that . . . that *This too shall pass away,* isn't that it?"

"Yes, but there's more to it than that. He says that to lose even the immediate impact of a sorrow is to lose something valuable—as serious a loss as forgetting the sharpness of a joy. They were wise people, the Medani. It was Thrennen that wiped them out, wasn't it?"

"I think it was." A brief ghost moved across Aidregh's forebrain: the shadow of his wife, dead before she had heard Aidresne's first cry. Dr. Ni, who had been the attending physician, had said that death in childbirth was not always preventable, even now. The marriage, late for Aidregh, had been a political one, but he had learned to love the quiet Noone girl. In the instant of the passage of the shadow, Rathe seemed of no importance whatsoever.

Then it was gone.

He shook himself. "I don't think it's for me, Ni. It's . . . depressing. I've got enough to depress me as it is."

"But it's none of it yours, my

friend. You need something to remind you of yourself once in a while —of the things that are important to you as a person. You're killing yourself in the name of a set of abstractions."

"Well," Aidregh said, rising, "that's what I'm being paid to do."

III

The ship made its first stop in the Archipelago, to drop off the scientists who had come from there; the Archipelago was highly important politically, for it represented the balance of power between Thrennen and Noone. Aidregh left the ship, and caught a plane out of Bros Airport for Drash.

Dr. Ni refused to join him; he said he was enjoying the cruise. Aidregh did not press him, though he could not help wondering what was so novel about a cruise to a naval officer.

The plane's pilot succeeded inadvertently in deepening Aidregh's gloom by approaching Drash from the side of Thrennen looking toward the empty ocean on the other side of the world, thus passing directly over an irregular patch of concrete set into the ground near the coast. The patch, several square miles in area, was studded with shallow concrete boxes, next to each of which was a small spot of shadow.

There were very few people in the world who knew what the patch was, but Aidregh knew well enough. The spots of shadow were the removable roofs of long concrete-lined tubes, each a hundred feet in diameter and leading deep into the earth. Steel guide-rails ran along the walls of the tubes, and at the bottom of each tube, on the rails, there rested an enormous guided missile, many of them already armed with their thermonuclear warheads. The concrete stubs visible from the plane were the tops of cubical control chambers set into the ground.

Rather complete intelligence reports indicated that there was another such battery on Noone, even larger than Thrennen's. Aidregh did not know how Noone's missiles were armed, and the Noonemen weren't talking, but there had been several test fusion explosions in Noone a few years ago. There didn't seem to be much doubt.

Nor could there be any doubt that there were such firing plazas on Rathe. That the Rathemen's weapons were nuclear rather than thermonuclear made no practical difference, considering the relative smallness of the targets on Aidregh's world; atomic bombs would be more than sufficient.

The two planets were circling each other like duellists with their knives at each other's throats.

Then the concrete patch had vanished behind the plane, and they were coming in over Drash—once a hide-hut village situated at the mouth of the biggest river which emptied into the sea on the western side of Thrennen, but nearly a thousand years of alluvial deposits had

done their work; now the nearest water was a mile away along a broad shelving beach. As seen from the air, the buildings of the city looked like so many parallelograms, ranging from thirty to a hundred and fifty feet square; their concrete roofs were only very slightly pitched, to allow for drainage of the frequent rains. The buildings were set wide apart, and Thrennen's lush vegetation hid the concrete paving that connected them, as the roofs themselves hid the massive concrete pillars that supported them, and the walls of lignin-impregnated plywood with their large oblong windows.

Noonemen commonly sneered at Thrennen architecture, which they said looked as if it had never left the blueprint stage, but Aidregh found it soothing; after all, it was home. He was obscurely glad to be back; the eclipse had unsettled him much more than he liked to admit, even to himself.

He went directly to his office and rang for Aidresne, who according to custom served as his aide. While he waited, he shuffled through the carefully-screened stack of papers left on his lectern as requiring his immediate attention. It was for once not a very big stack; the eclipse had conveniently scheduled itself while the Tribunal was not in session, so there were no bills to read. The political summary, prepared by the secretary-general of Aidregh's party, showed the situation getting worse at about its usual speed: too fast. The Opposition was gaining ground; even in Signath's absence, the populace was getting steadily more war-minded, and something similar was going on in Noone. It was perfectly possible, though not yet predictable, that a war with Rathe would have to be undertaken, as the only means of preventing the two islands from destroying each other—a "cure" precisely comparable to shooting the patient, but that appeared to be what was at the back of Signath's mind all the same. The Cluster only knew what inflammatory speeches he was cooking up right now, out of whatever he thought he had seen from the recon cruiser.

With a sigh, Aidregh opened the small cooking machine to see what the staff had sent him as a welcome-home meal, though he was, in fact, not very hungry. It proved to be roast tapir, a favorite of his, with three cultivated vegetables and two wild ones, all on the three "mechanical" plates which were the traditional service of the First Minister: one showing a sea-going vessel like Clian's, one a primitive aircraft with a stern-mounted jet, and one a rocket as thin as a stylus. That last had been Aidregh's own addition; each new Minister was expected to add one plate and retire one, as a symbol of the progress achieved under his ministry. The borders of the plates were formalized wreaths of triolets, the flower of Thrennen, arranged in recurrent groups of four.

Our architecture may not be very imaginative, Aidregh thought, but in ceramics nobody beats Thrennen

for grace of design, or fine workmanship either. Feeling obscurely better, he fell to.

"Welcome back, father."

Aidregh turned from his meal with a smile. Aidresne's close-cropped stubble of hair was black, which put him in a minority among the generally fair men of Thrennen; he had of course inherited it from his mother. He was a stocky youngster, somewhat shorter than Aidregh, and his father had never considered him handsome. (Luckily, Corlant disagreed.) But he was thoughtful and quick, which meant a good deal more.

"Glad to see you, Aidresne. I want you to take charge of the eclipse reports as soon as they come in—they'll be here in only a day or so—and prepare a summary for me. Unless they're overwhelmingly important, I don't want details; give me a weighted summary, together with any opinions the military may see fit to offer. But I want that military assessment *boiled;* you know how long-winded these generals can be."

"All right," Aidresne said. "I hope it'll be worth the work. Did much come of it, do you think?"

"Hard to say. I can't believe that the Rathemen would put up any key installations where we could see them. Any important structures that are on our side of Rathe would be likely to be obsolete—put up while the Rathemen still thought our planet uninhabited."

"That would be pretty obsolete, all right," Aidresne said judiciously. "By about five hundred years, I'd guess."

"You're exaggerating. They may have decided the planet was *habitable* as far back as all that, but they didn't know for sure that we were here until we discovered radio. Anyhow a century is as good as a millennium when it's military obsolescence you're talking about. How's Corlant?"

"She's just the same," the boy said, smiling faintly. "Wonderful."

"Good. I must say your prospective father-in-law takes a very dim view of your future, and everybody else's for that matter."

"So do I," Aidresne said slowly. "But I can still hope. I think Dr. Ni has forgotten how to do that, or at least he's out of practice."

"Well, I'm still hoping, too. I've got to. Any word from Nesmet?"

"Nothing at all. The planet's on its way back into opposition with us, though, and the astronomers at the satellite are watching for any signs of activity. What they expect to see is beyond me. I can't believe myself that Captain Arpen will attempt any take-off until the moment of closest approach; sixty million miles is plenty far enough to travel."

"It's more than that," Aidregh reminded him. "That's only the difference between our distance from the primary and Nesmet's. Don't forget that Nesmet's orbit is tilted eighty-seven degrees to ours. That lengthens the trip by more than a third again." He leaned one elbow

on the lectern and put his chin somberly into his hand. "As a matter of fact, we weren't ready to undertake anything so grandiose, not by many years. We only pushed ourselves into it because of Rathe. I'll be quite stunned if that expedition gets back at all, Aidresne, though don't tell *anyone* I said so."

Both men were silent for a long moment. Then Aidregh sighed.

"Everything depends on Rathe, as usual," he said. "I suppose we'd better try to talk to Margent again."

Aidresne shrugged and opened the door. They went out together, arm in arm, father and son. There was still that in a shaky world.

The communications center, like everything else dealing with Rathe, was secret; even the small underground monorail line which led to it from the capitol was known to comparatively few people. Of course, communicating with Rathe, via the orbital station, was only a small part of its function. It also received planet-wide weather reports, astronomical, physical, and medical research data, and navigation information from the station, and funneled

them out all over the planet. Since the treaty with Noone, the orbital station was no longer strictly a Thrennen enterprise, and the size of the center duly reflected that.

Most of the center's complement affected not to recognize their First Minister and his son at all; this was protocol, although most of the men were so busy that it was possible they never saw Aidregh and Aidresne anyhow. A staffer took them directly to the small air-conditioned chamber used by the high brass to receive important communications direct, as they came in. It was sparsely furnished: a few couches, a few lecterns, a small cubby for refreshments —and three television screens.

Aidresne sat down and waited matter-of-factly, but Aidregh picked out a lectern; he was too tense to sit, and in any event had always preferred to work standing. This was going to be work. After several moments, the central screen lit, swirled and steadied.

Margent was looking at them.

It was as difficult as usual to see exactly what Margent looked like, for he was swathed and hooded as always, with the many robes and capes which the Rathemen wore against the savage extremes of heat and cold through which thin-aired Rathe passed daily. The face that looked out of the screen was roughly like Aidregh's own; that is, it possessed the same organs in the same number and in about the same relationship to each other; but there were a good many small differences.

The Ratheman's eyebrows, for example, although they were dark and fierce, were not mounted on a bony prominence as Aidregh's were. His nose was not flat, and the nostrils, so small as to be almost invisible, pointed straight down; on either side of his nose were two small pits whose sensory function was unknown. His mouth was perhaps half the length of Aidregh's, and his chin did not jut forward at all, but was small and sharply pointed. All these, taken together with a forehead that was just as broad and even higher than Aidregh's, made the face inside the hood seem almost triangular.

The rest was conjecture, put together by scientists working partly from hints that Margent had let drop, partly from occasional glimpses caught under the folds of the robes, partly from the obvious terrain and meteorology of Rathe itself. The Rathemen's hands were six-fingered like their own—and so they, too, had worked out a duodecimal numbering system—but longer and more slender. Their bodies were slight, lean and tough, with skins like fine leather, but they were almost uniformly taller than Aidregh's race.

They were without doubt mammals, with two sexes, like Aidregh's people, but nowadays Aidregh found himself thinking of neither race in those terms. Obscurely, Margent made him feel as though Aidregh represented a species which had evolved directly from frogs, while the Rathemen seemed like a race of supremely

intelligent lizards. It was absurd, but it symbolized the sum of the differences Aidregh sensed between Margent and himself.

"We trust you had good seeing," Margent said in his dry, whispery voice. He spoke excellent Thrennen; Aidregh understood Rathe—the planet had only one language—but comparatively imperfectly.

"Very good," Aidregh said noncommittally. In the 1.344 seconds it would take the microwaves carrying his voice and image to cross the gulf to Rathe, and the identical lapse that would be imposed on whatever Margent said next, he found time to wonder whether the opening gambit had been meant as irony. Margent was referring to the eclipse, of course; but surely he also knew that the seeing all over Aidregh's world was infernally poor at best.

Margent, however, dropped the matter. "We believe that it is time we treated with each other directly," he said. "There are high matters coming to a head among my people which will not allow of long postponement."

"By all means," Aidregh said sincerely, but feeling the invisible hand of caution always on his shoulder. "Negotiation is obviously the only way out of the situation in which we find ourselves. Properly, our two worlds should be as bound together by trade and open intercourse as they are by gravity; it is the only civilized way."

"So I have long maintained," Margent said gravely. "But my thoughts cannot be my own here; they are composite thoughts, representing, in some part, attitudes to which Margent as a person cannot subscribe. Your situation is the same, I believe."

"It is indeed," Aidregh said feelingly. "But if you and I can come to any sort of reasonable agreement, I think I can control the dissident elements among my people—or, at least, nullify any hostile action they may advocate."

The time lag seemed interminable. Margent had almost completely taken him aback. Usually the Rathe-man was involved, subtle and indirect in everything he said.

"That is also true with me," Margent said. "But I cannot do it without direct contact; it is the price the religious among my people demand. When may I expect you, then?"

Behind him, Aidregh heard his son gasp. Evidently Aidresne, too, had not gotten the point until now; in their startlement at Margent's new directness, they had not spotted the still-present thread of indirection.

And the question was dynamite. A personal visit to Rathe now, however greatly the notion tempted Aidregh, would puzzle and disturb half the population, and—without more than a few prods in the right direction by Signath and the Opposition—it would absolutely inflame the other half. Altogether, it would do not a particle of good, for any agreements he might make with Margent as a result of it would be without

force; Aidregh's government would not outlast the initial journey.

"I misunderstood you," Aidregh said at last. "Is this present contact not direct enough? The beam between us is reasonably tight, I am told."

"The matters of which I speak cannot be discussed in this fashion," Margent said. "They are religious. I would not be permitted to broadcast them in any form. Personal contact is essential."

Religious? But it would do no good to ask Margent what he meant by that; he had, after all, just given his only answer to such a question: he could not discuss it.

"I see," Aidregh said. "Nevertheless, Margent, you find me reluctant for good reasons. There are State matters which demand my presence here; were I to leave now, I would lose control over my dissident people, and that control is essential to the survival of both planets. I speak bluntly; surely you can see the force of the argument?"

"I see it," Margent said. "But let me remind you that I, too, am in that same sense helpless. You must come. I assure you solemnly that nothing else will prevent war between our worlds in the long run."

The air hung heavily in the room. Perhaps—even probably—Margent had not meant that to be taken as a threat; to him it seemed a simple statement of fact. But a threat was what it was—the ultimate threat. With a dolorous heart, Aidregh looked to Aidresne.

His son said quietly, "We had better go."

"Very well," Aidregh said, turning back to the invisible cameras and the screens. "It will be a great adventure for me, if nothing else. But you, too, must yield in some measure to the situation here, Margent. It will be utterly impossible for me to come at once. I cannot even name a date now. How long can you postpone your crisis, whatever it is?"

"How soon can you come?" Margent said.

Aidregh drew a deep breath. "No sooner than a year from now."

Margent seemed to think about it a long time, but the tension had so distorted Aidregh's sense of duration that it might have been only the 1.344-second lag. At last he said:

"I can undertake that postponement. In the meantime I will be unable to talk to you. It is known here that we now have nothing else to talk about, except this one matter. Farewell."

Upon the word, the screen went dark.

IV

Floating a bill through the Tribunal providing the necessary funds, enough to provide for three ships capable of getting to Rathe and back, did not prove as difficult as Aidregh had anticipated. Publicly, of course, the appropriations bill was labeled only as "needed for the national defense"; those few tribunes who had to be told why the extra money was

needed—including, for reassurance's sake, the President of Noone and the Premier of the Archipelago—were told in strict secrecy that it was for a second attempt on Nesmet.

That did the trick, and the bill went through. After that, Aidregh was able to stop thinking about a journey to Rathe for a while. Most of the time.

The days were certainly full enough; they flew by as stealthily and swiftly as mice. First of all, the results of the eclipse came in, and they turned out to be far better than Aidregh had hoped. Of course the observations that had been made from the surface of the sea did not amount to much, but nobody had really expected that they would. Those that came from the satellite station, however, were full of detail. They added up to an almost complete map of the visible surface of Rathe, as it might have been photographed from a ship cruising only fifty miles above the planet. Every major and minor city was visible; the extent and nature of the deserts accurately charted; bodies of water, all the way down to small lakes, identified; roads mapped— It amounted to a real gold mine of information, much better than anything that had ever been available before.

"This is very good," he told Aidresne at last, after reading his son's report with prolonged and intense concentration. "Now we have targets—not only the major cities we already knew about, but smaller communications hubs, water supplies, and so on. And the generals say that this thing that looks like a spider web, here on this photo, is a key supply dump of some kind; the road-patterns leading to it are supposed to make that inarguable." He sighed. "If it comes to war, now, we'll be able to leave nothing on the visible face of Rathe but puddles of slag. What a horrible thing to be certain of."

"That's all very well," Aidresne said. "But what bothers me is that we still don't have any data on Rathe's offensive power. Nothing of that kind shows in this material."

"I know. We didn't expect them to be fools enough to put such things where we could see them. I think we know this much, Aidresne: whatever their striking force is, it's sufficient."

"But how do we know?" the boy objected. "Their weapons are only nuclear, and they'll have to shoot more or less blind. Some of us are bound to survive, whereas we know we can sear their visible hemisphere clean—and probably saturate the invisible side, with properly spaced megaton weapons."

Aidregh shook his head. "We don't dare lull ourselves with any such notion," he said. "They have vastly more land area than we have. Without accurate knowledge of targets, 'saturating' the other side of Rathe is only a dream. We'd get complete extermination of the Rathemen only by luck—if that's what we have to mean by 'luck' these days—and if they have deep shelters,

we wouldn't get it even then. The only sane way of viewing the matter is to assume that war would mean death for both of us; otherwise—"

A buzzer interrupted him. He opened a switch on the lectern, and Dr. Ni's voice came from the speaker under it; Ni was, of course, in Drash as a member of the eclipse team.

"Aidregh? News for you. Thought you'd better know right away. Bribed the chance to be the first to tell you."

"All right, Ni, go ahead."

"The Nesmet expedition is on its way in. They didn't wait for favorable opposition; they took off as soon as Nesmet rounded the sun on the way back toward us. They've been in flight over a year!"

Aidregh and his son exchanged stunned glances. That could only mean that Captain Arpen had discovered something of overwhelming importance. He would never have taken such a risk for any other reason.

"Go ahead," Aidregh said tensely.

"They just got in radio contact with Drash fifteen minutes ago, through the satellite station," Ni's voice said. Even he sounded mildly excited. "They're about a thousand miles out from the station's orbit now, but on our side of the planet. Arpen waited until Rathe was in our radio shadow before calling us."

"Of course, those were his orders. When will he touch down?"

"The day after tomorrow. He's dangerously low on fuel, and has to land by the most conservative method; I don't understand the details, of course. But I thought you'd want to know at once."

"Yes. Thanks." Aidregh closed the switch with a faint grin. Evidently his old friend was not quite so immune to great events outside medicine as he had pretended to be. But the grin disappeared in a hurry.

"This," Aidregh said slowly, "is a prime shock."

"What can it mean?"

"I wish I knew. All I can say about it now is that it's bad news."

"Bad news?" Aidresne said. "How can you know—"

"It's the Rathe expedition I'm thinking of, Aidresne," he said impatiently. "We got the money for it ostensibly to build another Nesmet ship, never forget that. I told Signath and those other idiots that I didn't think Arpen would make it back, and that we shouldn't be caught short if he didn't. I didn't want to tell them any such thing, but after that ultimatum of Margent's, I couldn't do anything else. And now here's Arpen back, and not only back, but something like sixty days before we could possibly have begun to count him lost!"

Aidresne looked at him appraisingly, and a little upsettingly, as though he were seeing his father for the first time.

"I wonder," he said. "Father, can you really be hoping that Arpen will still crash?"

"No, no! By the Cluster, Aidresne! You know better than that. We have to find out what's made him take a risk like this. I'm only explaining why this early arrival of his has put us into a political box. It has, that's all. That's all there is to it."

But Aidresne's suggestion had, for a moment, lighted in him an ugly little flare of hope. He fought it down, grimly.

Captain Arpen got his seared and battered ship down onto Drash Airport as lightly as any falling leaf, with just enough propellant left in its tanks to soak into a medium-large bath sponge. For a landing that was supposed to have been secret, of a flight that no one was supposed to know about, it accumulated a sizable reception committee even before the ship's hull was cool enough to allow the air locks to open.

Arpen went through the reception committee like a knife through cheese. Though he was haggard with exhaustion, he was equally deaf to all pleas that he and his crew rest for a few days before attempting to report.

"Where's the First Minister?" he kept demanding. "Osanto, if you drop those film cans I'll . . . all right, all right, just stick close to me and stay awake. Where's the First Minister? Ah! Aidregh, Aidregh! Make these flunkeys let me through! I've got to talk to you where it's quiet. Osanto, get into the Minister's car and pass me those cans. And don't you double-damn dast go to sleep, or you won't wake up for a week. Sir, can't we get the Isle *out* of here? We've been driving for over a year to get this stuff home —Osanto, wake up, the Cluster blast your soul—"

Aidregh issued the necessary orders in a hurry, and the car shot away from the airport. He was completely in awe of this cadaverous young man with the fiercely burning, glassily unblinking eyes. Captain Arpen had, after all, just finished the most epic voyage in human history; and the drive in him even now, when he was within an inch of keeling over, was like the fury of a blast furnace. In the face of it, Aidregh melted away as passively as a trick spoon in hot water.

In the First Minister's office, Captain Arpen and the zombielike Osanto, his observation officer—before the trip the most promising young astronomer in all of Thrennen —spread their photographs and maps indiscriminately all over the carpeted floor. Arpen talked to Aidregh, Aidresne, Dr. Ni and two anonymous generals as though he recognized none of them, spilling out the words with machine-pistol velocity between gulps of a hot drink some steward had pressed upon him. His eyes stared like those of a man who has seen a vision. Osanto said nothing and drank nothing; he only pointed drearily at the proper prints when Arpen's orders reached him, across some personal gulf of ultimate weariness.

"We stuck to the dark side of Nesmet all the time, except for a few forays into the twilight zone," Arpen said. "Nesmet has a few traces of atmosphere which we didn't expect—heavy gases, and not much of those. The dark side is a wilderness of snow, not real snow of course, but frozen methane and carbon dioxide and other organic gases. Every time one of those snowfields wobbles over into the twilight zone, it evaporates and goes howling off onto the hot side. At the same time, on the other terminator, the atmosphere gets caught in the shadow and freezes out within less than half an hour. There are huge spires of it built up as high as mountains, before you even begin to understand what's going on, but at the next libration it sublimes away again like two million hurricanes. Show them, Osanto."

Osanto nudged at a photo with his toe; Captain Arpen gulped at his drink.

"It's a miserable place to work," Arpen said. "Because of the atmosphere, and the distance, our pictures of the far side of Rathe aren't anything wonderful. But they're not too bad either— Where was I? Oh, the pictures. They pretty well confirm our speculations as to where the main highlands and lowlands should be. And they show several of the major cities. There's one real whopper; can't be anything but the capital of Rathe. They also show that the only major body of water the Rathemen have over there is smaller than the Niabrand Sea on *our* side; one single fusion bomb would boil it dry. Where's that infrared shot, Osanto?"

Nudge. Gulp.

"This is wonderful," Aidregh said. "It's already more than we'd hoped for. But captain, offhand I don't see anything sensational enough to justify the risk you took. What if you'd not gotten back at—"

"We got back," Arpen said fiercely. "And this is only the beginning. Sir, if you interrupt me at any length, I won't be able to stay awake through it. You can see what shape Osanto's in, and I'm not in much better, though I'm up to my ear-whorls in amphetamine. Believe me, these pictures we took on Nesmet are nothing. We got a series of thirty-five shots of the back side of Rathe *on the way in.* We tried to use the big telescope that close to home, but of course it didn't work. We lost it, and both men we floated outside with it to man it—one meteor, just one little speck of something, and *fft!* nothing but gas. But even from inside the ship, with nothing but the plotting 'scope, the pictures came out better than the Nesmet prints. Show them, Osanto."

There was no response. Osanto was asleep on his feet, so deeply asleep that he was not even swaying after his long battle with no-gravity, he was tied down to his home planet as contentedly as a mushroom.

"By the cluster!" Arpen said. "All right, let him sleep. He's been working like a slave." The captain went

down on his knees like a broken umbrella and began to paw through the pictures himself. At last he heaved himself triumphantly to his feet, weaving visibly with dizziness.

"Here it is," he said. "Look at this, sir. Almost as good as a contour map. And here—this regular white patch on the northeast highland. It's camouflaged, but it shows in the infrared; what do you make of that?"

The generals joined Aidregh in a huddle over the picture, but he did not need them. He had seen a thing just like this some time ago, from the air, near Drash.

"It's an artillery emplacement," he said slowly. "A Firing Plaza, like ours—and the one they have in Noone. But bigger."

"That's what Osanto says," Arpen said, regaining his balance with a terrible effort. His eyes were half closed. "Now we know where it is. We could hit it first if we had to. Osanto's picked out four or five smaller ones. He can show them to you. I can't, I don't know the signs."

"Four or five?" Aidregh whispered. "Are we as outgunned as all that?"

"Don't know," Captain Arpen said drunkenly. He forced his eyelids up again. "Anyhow, these pictures aren't the reason why we left Nesmet early. We knew we were going to try to get them on the way

back home. And we couldn't predict how they'd turn out. We didn't take off until we'd found . . . it was—"

He stopped and looked with awful eyes at Aidregh. "What was I saying?" he said. "I was saying something."

"Something you found on Nesmet, something that sent you home early. Captain Arpen, can't you let it wait until—"

"No," Arpen said. "No. Sir, there was a Rathe expedition on Nesmet. That was what I wanted to say. Sir, they beat us to it"

"Are you sure?" Aidregh whispered.

"No doubt about it. Their camp was pretty well beaten up, but not so much that we couldn't identify it positively. It's theirs. There are remains of still a third observation station on the planet. It isn't ours, and it isn't Rathe's; and it's *much* older, much older. Who could have put it there we don't know. But it gave us weathering and other standards for assessing the age and nature of the Rathe camp. The Rathemen landed on Nesmet a year before we did. Maybe two."

"Aha," one of the generals said, as though whatever had occurred to him satisfied him profoundly. "That means that the Rathemen have pictures of *our* 'invisible' hemisphere, too. Very interesting."

"Yes," Arpen said. "I thought it was interesting. That's why I left Nesmet early." He sighed raggedly. "There. Are the . . . Pictures . . . I brought . . . them . . ." His breathing was broken by a sudden convulsion, and he began to lean.

"Home," he said. His eyes closed, and he toppled as though he had been stoned. The strewn photographs fluttered out from under him.

Dr. Ni was kneeling beside him in an instant, feeling for his pulse, auscultating his chest. The photographs came to rest in the general litter. The physician raised his head slowly, looking up at Aidregh with a blank and astonished face.

"Why," Dr. Ni said wonderingly, "he's dead, Aidregh. His heart burst."

Aidregh could not move. He looked down sorrowfully at the contorted, wasted body—the detritus of a hero. He had never known Captain Arpen well; mixed inextricably into his sorrow was the knowledge that nobody would ever know who had established that third—no, that first! —observatory on Nesmet; nor why. Where could the observers have come from? Surely not from frigid Gao, a planet twice the size of the home planet or Rathe; an enormous four hundred fifty million miles from the white sun, its atmosphere a poisonous mixture of hydrogen, methane and ammonia. Surely not from the next nearest satellite of planetary size, the thirty-nine hundred-mile Herak I, eighty-five thousand millions of miles from the white sun?

What life-form, incredibly different from Aidregh's race *or* the Rathemen, could be still abroad in

this wide-flung, cold, perfectly hostile solar system?

They would never know; their time was running out. Neither they nor the Rathemen could bother to do so much as ask the question, let alone hope for an answer.

This was the end of the line. The targets were known, now, on both worlds. When the missiles flew, they would go home unerringly. Arpen had died to make that a fact; and perhaps some Rathemen had died, earlier, for the same cause.

The cause of suicide. That was for Margent to judge, if he could. There was nothing left for Aidregh now but the expedition to Rathe, far too soon, and for no hope . . . no hope at all. The knives were now more than at the worlds' throats. They were poised above their backs.

V

Maybe I've got no business being First Minister of Thrennen anyhow, Aidregh thought later; every time I think I understand how people are thinking, they show me that I really haven't had the foggiest notion.

For instance: the primary public reaction against the expedition to Rathe, as it turned out, was not political at all. It arose instead from the fact that the trip would postpone the wedding.

The courtship of Corlant and Aidresne had been followed with the greatest avidity by the press almost since its beginning, to the great discomfiture of both of them. Inevitably, and against both their wishes, the marriage ceremony had been planned as a massive State affair, attended by functionaries of both Thrennen parties, as well as by diplomats from every other nation. It had been a generation since Thrennen had seen such a circus of pomp nicely blended with sentimentality, and the public, already fed to the teeth with the constantly overhanging threat of war, had been waiting for this new spectacle with its figurative tongue hanging out.

Nevertheless, postponed the wedding had to be, no matter what the public thought. Aidresne had to go with Aidregh to Rathe, as a matter of course, and there was no way to sweeten the dose; were Aidresne to be left behind, Signath would lose no time in branding the expedition an act of suicide, with Aidresne deliberately left in a position where he could pick up the reins of power and keep the Opposition out of the government. That would be sufficient at least to drum up a recall referendum, which would be weakening no matter who won it. Of course, taking Aidresne along exposed Aidregh's party to the contrary charge that Aidregh was cutting the head off his own government, but that was a weak tack to take with a public that expected the First Minister's son to accompany him on every major political journey, no matter how far away.

Then Corlant was announced.

Aidregh was more than glad to see her, and happily jettisoned his business for the time being. He was quite convinced that she was the loveliest girl he had ever seen in his life, excepting only his wife, and had felt nothing but warm approval of his son's good taste when the engagement had been decided upon. But the expression on her face when she came in sent a stab of misgiving through him. Like all Thrennen women, she lacked the rather prognathous jaw common to the Thrennen male, indeed in Corlant the jaw line was quite rounded; today that plump firm arrowhead was echoed by another arrow cut deeply between her eyebrows. His fears were confirmed by her first words.

"Aidregh," she said in her low, melodious voice, "I have a citizen's petition. I want to go on the Rathe expedition."

"I can't let you do that," Aidregh said gently. "It's going to be pretty dangerous, Corlant."

"Captain Arpen made it to Nesmet and back," she said quietly. "That's much farther. And the ship he used wasn't as good as the Rathe ships will be—and it wasn't a livable planet he was going to, with people to help him when he got there."

"All true," Aidregh admitted. "But Arpen's feat was something more than a miracle, Corlant—and even so, it killed him. This trip of ours is still going to be hazardous; we aren't advanced that much in the art of spaceflight. There just hasn't been time to profit by most of Arpen's experience."

"I'd be glad to take the chance."

Aidregh thought a moment. Corlant's expression offered him no hope that she was going to be easily persuaded; she looked gracious, feminine, reasonable, and about as yielding as a female tiger defending a cub. She was magnificent, but she had him in one of the nastiest spots he had ever been in.

"You're not afraid of the Rathemen?" he asked tentatively. "They may not be as helpful as you postulate."

"No, I'm not afraid of them," she said. "I even think I like Margent, from what little I've heard of him. He seems to be a lot more attractive than Signath, anyhow, or than a lot of other Thrennen men I've met."

Since this was precisely Aidregh's own opinion, he could not counter it very convincingly, and he did not try. The fact that he felt a surreptitious liking for Margent could not be defended logically, and it did not render Margent or the Rathemen in general one whit less dangerous potentially, but if Corlant was not afraid of them—and it was transparently obvious that she was not, and might never be—then that was that. He brought his last piece of artillery up onto the firing line, absurdly conscious of how small a caliber piece it was.

"I still don't see how I can do it," he said. "I'm told that the weight

allowances on the ships have to be figured to very close tolerances. We can't afford to take anyone with us who doesn't have some absolutely indispensable skill, or isn't otherwise needed in the negotiations. Otherwise we might not arrive. In other words, Corlant, we can't carry any passengers; in one sense or another, we'll all be crewmen."

"I can be as much of a crewman as Aidresne," she said. "His skills only duplicate yours—he's a diplomat, and you'll be handling all the diplomacy. He's going because it's traditional for him to go, and because it's good politics. That makes him a passenger, by your own definition. Isn't that true?"

"Well—" Aidregh stopped and drew a rueful breath. "Yes, Corlant, it's true. But—"

"What about my father?"

"Oh, now, that's a different case entirely," Aidregh said with some relief. "He'll be the flight surgeon; the only one along. He's clearly indispensable."

"I don't agree," Corlant said with a sudden and disquieting smile. "There are surgeons better qualified than he is to make the trip; he isn't even a member of the Aero-Medicine board. He got picked because he's the First Minister's surgeon, and for no other reason. You can't deny it, Aidregh."

He shrugged helplessly. What she said was so, but it was vastly oversimplified; he knew he could not begin to make any impression on her with the thousands of small corollary reasons for these choices. She came forward and took one hand in both of hers, looking up at him with sudden earnestness, like a child.

"Aidregh, please listen," she said. "I know it's dangerous. But you're taking Aidresne and my father with you all the same. If you're all killed, where will that leave me? More than half of my life will be destroyed; I'll be nothing. Don't make me face it. It would be much better for me if I died with the rest of you, if that's how it's going to be. You can't condemn me to stay behind, waiting for everyone I love to be destroyed at one blow—and then to keep right on living, just as if an empty life were worth living. It isn't. You know it isn't."

He knew it well. The ghost of his wife moved briefly in his mind again. What would have been left for him, back in those black hours, if it had not been for Aidresne, the newborn infant to whom she had gladly passed on her own life? He would not be First Minister of Thrennen now; he would not, probably, be anything but a broken and embittered man, senile and useless in his prime. Only the cherishing forward of that surrendered life had fitted him to take custody of the life of his whole world of Home.

"All right," he said huskily. "You can go along, Corlant. I think we need you."

Her hands tightened on his. He hardly realized that she had kissed him, however lightly, until after she was gone; but the spectral after-

impression stayed on his forehead, like the wing-brush of a moth in a spring night, until he had calmed down enough to notice it. In the midst of calamitous doubt, the sensory imprint was like a moment of truth.

Curiously, the press reaction was grudgingly favorable. One widely read, breathless columnist, a great favorite for two decades with the part of the press controlled by the Opposition, dabbed at her eyes and called the arrangement "divinely handkerchiefly." Most of the rest of the editorialists were able to keep their noses from running compulsively at the very thought of Corlant's accompanying her father and her lover to Rathe, but they could not find it in their pens to oppose it, either. The best that they could do was to suggest, mostly between the lines, that Aidregh had planned this superb piece of sentimentality from the beginning, to play on the public's heartstrings. Aidregh was content; that line would not get them far, in the face of the fact that the public's heartstrings plainly *had* been struck a resounding twang.

But Aidresne was furious.

"I'm sorry, Aidresne," Aidregh told him. "But she *did* ask to go, after all. And this whole reaction to the wedding postponement has given me a handle—an unexpected one, I'll admit—for turning people away from the much more dangerous political implications of the flight. This is one angle Signath *can't* turn his fire on. If he does, he'll just alienate his own followers; everybody thinks the world of you two, regardless of what they think of me. And as long as that's where the major interest lies, I've got to encourage it."

"But why does everything we do, everything we think or feel, have to be turned into politics?" Aidresne demanded. "I was already sick enough of having Corlant's every move, and mine, reported on the next day to the whole continent. And now you've got Corlant on what is actually only the second interplanetary flight we've ever attempted —despite the fact that she hasn't any qualifying skills you couldn't find in thousands of other women, or men—"

"She'll make herself useful, I'm sure," Aidregh said. "Calm down, Aidresne. The thing is done, and it seems that most of the people approve of it. They may even be right. Suppose we leave her behind, and we all do come to a bad end? Where would she be then? The ex-fiancée of the dead son of a dead First Minister—and without a father to boot? Why, she'd be natural prey for every adventurer who—"

"All right, all right," Aidresne said, almost surlily. "Please, father, don't be plausible at me. I know your reasons; I still don't like it. I was reconciled to being wired for sound all my married life, but this is something else again. I don't like it, that's all."

Aidregh had to leave it at that.

He was a little afraid that Dr. Ni might yet take the same tack—after all, it had been Ni who had first raised this question of sacrificing personal values to political expediency, way back during the eclipse. But Ni seemed to take the whole thing almost as a matter of course. He was much more excited about going on a real spaceflight, a notion which seemed to have shaken him almost entirely out of his world-weariness. Sometimes, indeed, he chattered about it like a breathless adolescent. Told that Corlant would also be making the trip, he merely raised his eyebrows and said abstractedly:

"Oh? Well, if she wants to go . . . I can't say that I blame her—You know, Aidregh, Captain Loris was telling me only this morning that as we approach turnover, we'll have with us a flight of small unmanned radar vessels to scan for missiles while we're unable to scan for them ourselves, and that—"

As for Signath, though his major line of attack had turned out to be somewhat beside the point—evidently he had been as surprised as Aidregh by this reaction from the public—he did not take long to swing into action. The day before the ferry rockets were scheduled to start conveying the expedition to the satellite station, in whose orbit the three ships which would make the actual trip were waiting, Aidregh heard part of one of his speeches. It came in days after it had been delivered, through a recording which had been sent to the office along with the report of the party secretary-general, and went unheard for some days after that; Aidregh had little time for party politicking now. Signath had said:

"Let me remind you all that we have not been told why our First Minister wants to go to Rathe, at the bidding of this creature called Margent. I predict that we will never be told, unless we demand to be told; and I predict that then we will be told lies.

"Let me remind you all that to allow any member of the party in power to negotiate with an enemy is to invite a sellout. Let me remind you all that it was First Minister Aidregh himself who negotiated the previous sellout to Noone. But evidently this was only a small thing for him.

"It was not enough to betray the whole continent of Thrennen, chiefest of all the nations—until his party began guiding its destinies. No; Aidregh is ambitious. He wants to be the first man in history to sell a whole world. I predict that if this Rathe expedition is allowed, our pro-Rathe First Minister will come home little better than a lackey of this Margent and his fellow-monsters, unless we prevent it. But we must be firm and resolute; this is not a time for hesitation and soul-searching, but a time for action—"

And so on. It was the expected gambit. Aidregh hoped that at least some of its teeth had been pulled by

this really quite irrelevant matter of the wedding postponement.

On the other hand, Aidregh thought with spurious detachment, do gambits have teeth? There I go mixing my metaphors again; Ni says that that's a sure sign that I really don't know what it is that I'm thinking about. Maybe what I really think is that Signath is as dangerous as ever.

But the three ships took off from the satellite station for Rathe on schedule.

TO BE CONCLUDED

IN TIMES TO COME

Next issue features H. Beam Piper's yarn, "Omnilingual." We have, in past issues, had various articles about "How to Learn Martian" and "How to Speak Martian"—but this novelette presents a different problem. How to *read* Martian—when the last Martian died some forty thousand years before the first human towns came into existence? Incidentally, I strongly recommend it as a piece to use in explaining the essential philosophy of science and science fiction to your non-scientist, Liberal Arts friends—which comment you will understand more completely after you've read Piper's excellent story.

Also coming next month; another article concerning the Hieronymus machine. Further research has led to some discoveries that will remove your last doubts that there may be some perfectly ordinary physical-science explanation of its performance. If you've been thinking of building one, but haven't quite gotten round to it—wait one more month. It's far easier to build using the printed circuit technique described next issue.

THE EDITOR

SECURITY RISK

Information was most certainly leaking. But the leak was not quite in the direction the Security force suspected....

BY POUL ANDERSON

Illustrated by van Dongen

I didn't want to believe it of him. In his quiet way, Sherman was one of the most beloved men in the Project. But you can't tell, you can't ever look behind the mask which is flesh. I remembered Horn from years ago: another pleasant man, who shared my fondness for Siamese cats. And *he* had been slipping information to the Communists.

In an age of chaos, when today's stout ally is tomorrow's wolf at your throat, it's hard to know where your loyalties lie. My own were clear enough, for the enemy had landed in California and my parents lived there if they still lived at all. But I don't presume to weigh another man's soul; I catch him and bring him to trial, and the final judgment is not for mortal men.

Walker leaned back and lit another cigarette. The vile wartime tobacco crept in smoke across the desk to sting my nostrils. "Of course," he said, "we don't know Sherman is guilty of anything but a small technical breach of regulations. All we've established is that he takes certain papers to his room at night."

"Maybe just to study them?" I ventured hopefully.

"He could do that in his own office. Those papers aren't supposed to leave the main laboratory, Harkness. Not ever."

"Distractions around here," I said. "Wrong environment. Research is a high art, sir. And artists occasionally need the right surroundings if they're to accomplish anything."

"That may be," admitted Walker. "It's hard to see how he could communicate with anyone outside. If it is only as you suggest, only that he wants privacy to think about the stuff . . . well, I daresay we can wink at his flouting the regs. But if that's all, why hasn't he asked me if he could? Why so secretive about it? The sole reason we know he's doing it is . . . well, I just told you."

I nodded, reluctantly. Bassington had wanted data on alloy properties at midnight—his gang often worked around the clock—and had gone to the secret file. The folder he needed was missing. The next morning it was back in place. He reported the matter to Security, and a quiet check revealed that only Sherman could have removed it. Since then he had been watched, and it had happened every night. Now I was being assigned to find out why and, if necessary, to arrest Sherman whom I liked.

"He doesn't have any idea you're in Security, does he?" asked Walker.

"Not as far as I know, sir. I *am* a physicist too, working over in Propellants."

"All right. You're hereby transferred to Explosives."

"That'll be hard to explain, won't it? I mean, the missile to deliver the bomb isn't too closely related to the bomb itself."

"Precisely," answered Walker. There was a thin smile on his mouth. "You'll have every bit as hard a time explaining it as Sherman is going to have explaining why he, in Explosives, wants data from the rocket section."

At that, we didn't need a very elaborate cover story. After all, the missile and its warhead had to be engineered into one unit. A certain amount of liaison between the two main divisions of the Project was necessary.

As a matter of fact, we had found that work went faster if we didn't erect more than a very low wall of secrecy between our different branches. A man working on the arming mechanism of the bomb could often stimulate his own thinking, get a fresh viewpoint, by talking his problem over with, say, a fellow developing the "brain" which would steer the rocket. Both jobs were electronic. So people mingled rather freely inside the Project.

Of course, they never got outside it. They never would, till the war ended or till a hostile bomber found us and flattened us. Nobody went in or out of the high fence except a few top officers, and they were always under the eyes of a military guard, day and night.

With the enemy holding most of Asia and the Pacific, ramping through Afghanistan toward Europe and building a bridgehead on the American West Coast, it was a small sacrifice. If the Project succeeded in time, we would probably win the war. If it did not, or if the enemy learned about it and destroyed it, we would certainly lose. Things were as simple as that.

I walked up the steps of the so-called bombproof and into the sleazy shack which camouflaged it. Green, wooded hills rolled away in morning sunlight, with here or there another hut disguising a ventilator or a garage or an entrance. Everything which mattered had burrowed into the Earth, and the trees hid the electric fence and the tramping sentries.

Standing there among wildflowers, under tall white ranks of cumulus, I knew a moment when it was hard to believe that here free men stood with their backs to the wall while the anthill civilization of a conquered Asia grew daily higher beyond this sunlit horizon. Then a jet squadron whistled overhead, eastbound to some battle over the Atlantic, and I remembered.

I went to the pseudo-greengrocer's of our pseudo-hamlet and down another flight of steps and along a corridor coldly lit by fluorescents. The air smelled dank. A pair of technicians trundled a bottle of liquid oxygen past me, and doors stood open on a bustle of smocked figures and a jumble of apparatus, but somehow I felt very much alone.

I found Sherman in his own lab. He nodded vaguely at me and continued giving directions to an assistant. The fellow took notes obediently enough, but I didn't miss the look of surprise on his face.

"All right," said Sherman, after a longish while. "Set that up, run it through the computer, and get me the answers day before yesterday, if not sooner."

"But the others—"

Sherman went to a desk and scribbled something on official stationery. "Here. This gives you top priority. Bump everybody else. Leap!"

The man stood there for just a second, then took the paper and walked swiftly out between looming generators. Sherman turned to me and thrust out his hand. I took it.

"Hullo, Harkness," he said. "I understood you were being transferred over here. Didn't expect you so soon."

He was a medium-sized man, with untidy clothes and untidy brown hair above a wide, snub-nosed face. He looked tired and, somehow, harried. It was hard to see in him one of the foremost of that stupefying plunge into the mathematics of space, time, and energy which has given us an entire new cosmos to think about. Or to see in him a traitor. But—

"What's the reason?" he asked. He took out a stubby, charred pipe. "Co-ordination wasn't very clear about it. Glad to have you, of course"—hitherto we had only met socially—"but I really don't need any extra help."

"We do, though," I said. My lie was prepared, I delivered it easily. "You see, we're getting to a stage where we have to know the exact mass and dimensions of the warhead to go any further. It would help, too, if we knew something about the way it will be connected to the rest of this hell's engine—safety circuits, for instance."

"I see." Sherman opened his tobacco pouch, scowling. "Didn't realize you were that far along. A rocket able to go halfway around the world—it can't be dreamed up overnight!"

"We had all the experience of World War II and the so-called peacetime research," I pointed out. "At any rate, Co-ordination thought it would be a good idea for me to work with you a few days and get some insight into your end of the Project."

"It's in the reports," he said irritably, tamping his bowl.

"Not the same thing at all. You know that. Engineering is a matter of . . . of *feel* . . . especially when we're so close to the end."

"I see," he repeated. He made an elaborate business of lighting the pipe. "Yes. Though I'm really a theoretical man, y'know, not an engineer at all. I look at the problem from a broad analytic standpoint and let the other chaps worry about the details."

"All right," I snapped, losing patience. "I know all that. But let's have some details."

"I'm afraid they won't be available for a while." Sherman looked past me.

"What?"

"It's a new approach." He spoke eagerly, but still didn't meet my eyes. "An entirely different reaction—perhaps a million times the energy release of the one we had in mind."

I stood very quiet.

"It has to be studied out," he said

in an urgent tone. "Those data I just gave Smedley to put through the computer—they'll give me some inkling as to whether we can do it or not. If we can . . . don't you see, Harkness? We won't have to build a thousand missiles. A hundred at the most—fifty, I think—will end the war!"

"Assuming this works," I muttered slowly.

"I'm quite sure it will. It's worth investing a few weeks to find out, isn't it?"

I had a sudden thought which stopped my heart for an instant. There was more than one way to sabotage the Project!

God knew how many thousands of highly skilled man-years had gone into the present bomb, the one we meant to use. Atomic energy is still such a new field. A false lead, one which would send us all up a blind alley for a year or more—and meanwhile the enemy roared across the Sierras and through Suez.

Sherman caught my arm. "Harkness! What's wrong?"

"Nothing," I mumbled. "Overwork."

I reined myself in. The job had suddenly grown immensely bigger. Big enough to frighten me, big enough to overshadow the entire planet.

There was just one way I could see to do my task. I had to get Sherman's confidence. He was only a man, I told myself, only a man, neither devil nor god nor cloak-and-dagger conspirator by nature. If he dropped a single careless hint to me, it would serve.

I was going to have a hard time becoming his friend. The agony which had been New York, San Francisco, Bandung, Capetown, a score of cities yelled to a smoking sky for revenge. And I must break bread with a man who might be working for their murderers.

"Well," I said, "my orders still stand. Maybe I can even help."

"Maybe you can, at that," he said disarmingly. "You'll have picked up a good bit of first-hand information about alloys over in Propellants, and this job may call for some very special alloys." He glanced at his watch. "It's nearly time for lunch. I don't like the cafeteria. Let's go to my place and have some sandwiches and talk it over."

As a bachelor, Sherman had only one small room. He had fixed it up in the past couple of years so it had become almost an extension of himself: a trifle dusty, books heaped everywhere, two abstract paintings on the wall, a desk littered with bescrawled sheets of paper. He put water on to boil and broke out tinned meats and a ripe cheese, talking all the while.

The reaction he had in mind was awesome enough. If it did work, then it would, in soberest truth, end the war. But I knew how many theoretical possibilities never materialize in time to do much good.

"It'll take a lot of engineering," I objected. "Just suppose it is prac-

ticable. It'll still take us longer to make it work, work efficiently enough for military purposes, than to wind up the original Project."

"No," said Sherman. "No, if that were the case, of course I wouldn't waste time on it. But—it may be simpler than you think. I may be able to give Co-ordination a full set of blueprints in a few weeks . . . perhaps they can have it built, tested, and in use before New Year's!"

I whistled. This was too fantastic to swallow. "I thought you said you weren't an engineer," I objected feebly.

"I'm not. I'm a theoretical physicist. But this problem . . . oh, rot, I'd have to spend three years educating you before you could see what I mean. Let's just say it's, uh, unusually susceptible to analysis."

That was a lie. Sherman was not a good liar, I could see the flush go up his cheeks and he got abnormally busy with his sandwiches. I felt cold.

"How did you get the idea?" I asked.

"It's nothing new, really. The reaction has been known for a long time; the problem was to generate it on a sufficiently large scale. I . . . I got to thinking about it. I'm still only in the thinking stage, actually: that's why I haven't yet filed any official report about this. But all I ask is a few more weeks."

"You do quite a varied bit of thinking," I remarked. My eyes wandered across the bookshelves. "I see you're still interested in this extrasensory business."

That had been in his dossier, the somewhat crankish preoccupation with telepathy, telekinesis, precognition, a shadow domain about whose very existence the scientists couldn't agree. But his work in physics had been too blindingly brilliant for us to look closely at so small a fault.

Or was it small? I wondered. A mind attracted to such mysticism might easily be sucked down by the quasi-religious ideology of the enemy. Freedom is, above all, a state of the practical mind, the natural condition of sober men among sober realities; the pomp and glitter of, let us say, a Coronation in London is only froth above the daily routine of parliamentary government. It is the tyrants who make everything into an ecstatic rite.

"Yes." Sherman turned around, his eyes kindling. "Yes, you know, there is something there. I've experienced it, felt other minds touching mine—" He shook his head, wryly. "Trouble is, there seem to be very few people who can have the experience. Whether that's due to some inborn difference, or only to conditioning, I don't know. But the fact remains. I can perform an ESP experiment to my own satisfaction, but I can't reproduce it for a disinterested audience. They'd only see me lying in a kind of Hindu trance. If they tried it themselves, doing exactly as I did, nothing would happen."

"Interesting question." I remembered I had to win his trust, and

for a man like this the best way to do it was to talk about his own hobbyhorses. "Reproducibility is the characteristic of science. If every competent observer can't check an assertion for himself, it isn't acceptable. And yet—"

"Yet there are experiments in the real world which are not reproducible." Sherman piled sandwiches on a plate and poured water into the coffeepot. "You yourself are one, you know. You exist, but there's no known way to create another, identical Simon Harkness. Modern physics is full of such propositions: consider the uncertainty principle."

"Uh, yes." I took a sandwich. "Isn't there something in your own work, your mathematical work before the war, I mean, on the same order?"

"You mean the parallel universes." Sherman grinned at me, but there was something else above the humor, a tension— "That was the one the newspapers made such a sensation about."

"Well, it was sensational enough."

"Merely a sideline," said Sherman. He whispered, as if to himself, and there was pain in the whisper: "Then." After a moment: "An incidential consequence of the definition of change of state I had to adopt to account for . . . well, look it up yourself sometime. An electron, or any other particle, has only a certain probability of being where it is, to speak Irishly. In principle, it could be anywhere in the universe. From my definition, it follows that the particle *is* anywhere. It's both here and in Japan and on Mars and in the farthest star—every possible configuration of every existing particle of matter or energy. Each configuration represents a complete universe. Throw in the time variable, and you have a complete set of continua, from origin to extinction."

"I remember that," I said. "But isn't the joker that, well, you can't test this theory? That there's no possible physical interaction between these different configurations?"

"That's right," he nodded. "By definition, almost. If there were interaction, if a particle went from Configuration A to Configuration B, they wouldn't be A and B any longer."

He looked at his paintings. "But of course," he said, so low I could barely hear it, "the mind is not a structure but a pattern. It isn't physical."

And then he would say no more. He switched the talk back to practicalities, throwing himself into the details of what I could do to help. It was as if he were trying to escape something.

As the head of his department, Sherman necessarily had broad discretionary powers. He could hold up work for a few days while he fiddled with his esoterica. But not much longer.

After a week, I seized a chance to speak with Walker. "Tell Co-ordination to have patience," I urged.

"Give him . . . me . . . a bit more time."

My chief scowled at the wall which penned him underground. "Why?" he said. "Either the man has a genuine lead, in which case he should make a definite report and recommendations *now*—not when he happens to feel like it—or he's leading us up the garden path." He swung on me, savagely. "And in that case—d'you think he's doing it deliberately?"

"I don't know," I said. "I just don't know."

"Well—"

"But he's had us making tests with the proton accelerator. And he's hogging the computer, having equations solved that he just hands to the personnel without a word of explanation. Does he pull them out of his head? Even Sherman can't be that gifted. And yet, those tests and computations he orders are not mere fakery. They make good physical sense. Only yesterday, we proved that this reaction really will take place on the scale we need."

"There's still all the engineering work," said Walker. "It could tie us up for years. We *know* our present bombs can be made, and that they'll hurt the enemy badly."

"If Sherman's bomb works, we'll know more than that," I said. "We'll know with absolute certainty that we're going to win. The Project as it stands right now can't guarantee that. The enemy has underground installations *too*, you realize. Sherman's bomb will get those, ours won't."

"Ours will break their cities open like rotten eggs."

"And perhaps make them all the angrier. They can live better off the country than we can. We aren't going to be sure of pulling their teeth unless we can smash their deepest-buried factories—or sink their biggest task force with one missile."

It was as delicate a problem as men had ever faced. The aerial annihilation of the war's early phase had ended: bomber-killing rockets became too effective, and neither side had yet developed a missile with more than fifteen hundred miles range. Our intercontinental atomic torpedo would redress that situation, but unless it carried the Sherman bomb it might not tip the scales enough.

"All right," said Walker. "But if he really is sincere,"—his finger stabbed at me—"why is he taking those plans and data on the antipodal rocket home with him every night? *That* doesn't hook in with his new research, does it?"

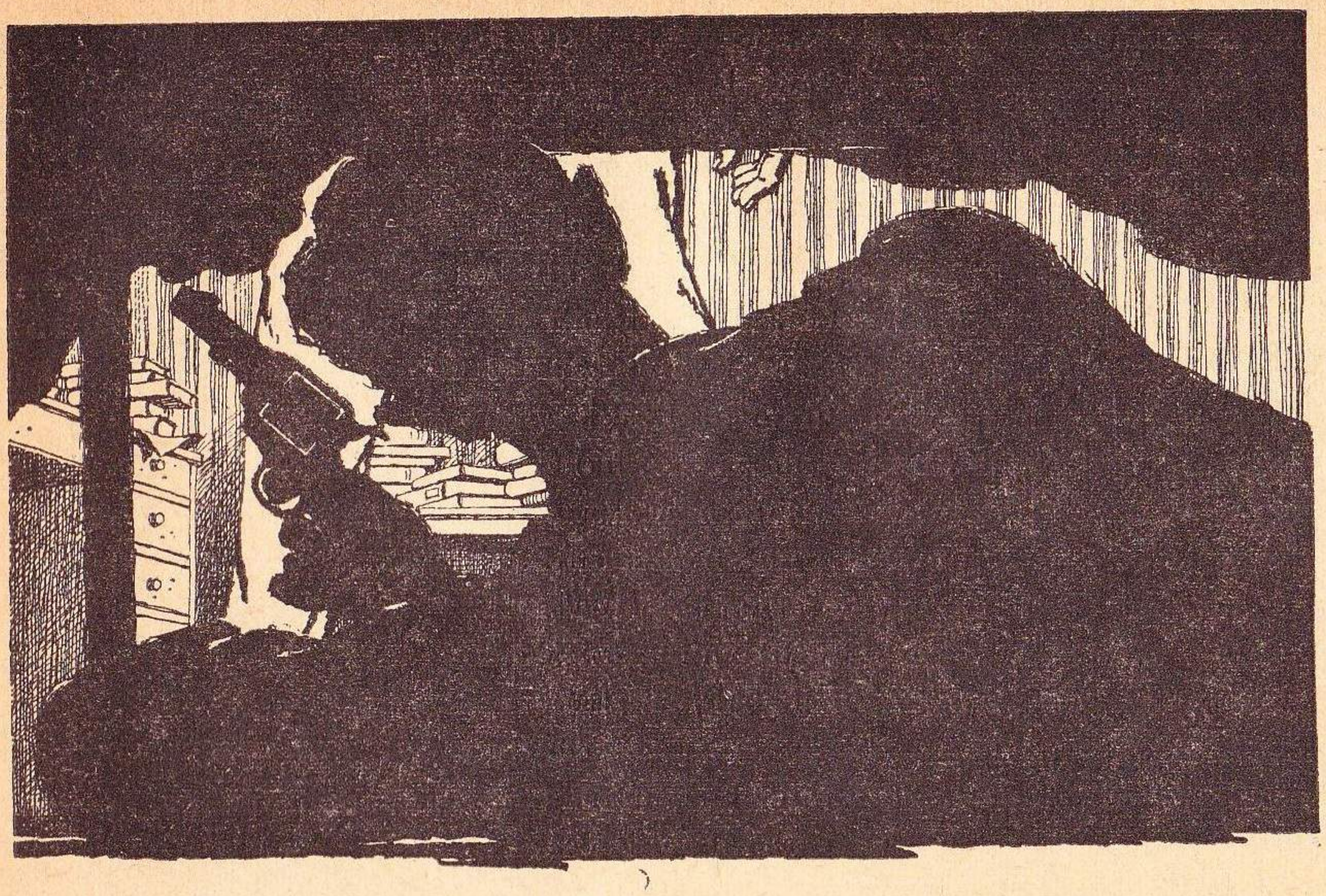
"No," I admitted. "And still—"

"What?"

"Call it a hunch. If I told you how often I've played hunches, you'd give me the sack this minute. And yet I have a pretty good record in the Secret Service."

"You think he really is on our side, then?"

"No," I said. "Not entirely. I get the impression of . . . of divided loyalties. As if . . . I don't know.



I couldn't tell you who is sharing his loyalty."

Walker riffled the dossier on his desk, though he must have learned it by heart. "He was tied up with the World Culture League before the war, and that was an enemy front," he said. "As far as we could tell, he was innocently involved, and got out as soon as he discovered the truth about them. But—"

"But what's he doing with those rocket data?" I finished.

"Nevertheless—" Walker got up and paced the floor, heavily. "See here, Harkness. Let's assume he is a spy. How does he transmit the information?"

The stillness grew cavernous.

Walker whirled on me. "I say, what's the matter? See a ghost?"

"Maybe," I whispered.

"What is it, man? For God's sake!"

"Don't ask me to tell you. Not yet. I don't really believe it myself." My words stumbled past each other. "Look, chief, can you have him called on the carpet tonight? It'd be easy enough. Co-ordination is champing at the bit. Have Sir Hugo call him in and ask what the hell he thinks he's doing. Detain him for a couple of hours."

"And meanwhile you search his quarters?" Walker grinned harshly. "My dear fellow, it's been done twice already."

"Maybe the other people didn't know what to look for," I said.

I could not help feeling a certain

guiltiness. Sherman had opened himself to me—not much, but more than to any others. There was that curious attraction between us which arises among some men and makes them glad to be together.

Not that we exchanged confidences. We simply lost a degree of shyness, and were not afraid to be enthusiastic. I listened to him burble about his hunting lodge on Lake Superior; yes, I must come up there after the war, and he heard me rave about my Siamese tom. We shared a fondness for Bach and—oh, many things.

Now and then he touched on his ESP, but shied back from it like a startled horse. It was the great thing in his life, greater even than his mathematics, but when it broke forth he curbed himself, queerly afraid of saying too much.

And once, when we had worked very late and cracked a bottle of whisky and been hit rather harder by it than we expected, he had said something about a woman, the only woman alive for him, but he could not have her, not ever— He shut that off, too, as if a barrier had clanked home. I guessed he was in love with someone else's wife. Poor devil! It turned out to be worse than that.

So while he sweated under the Oxonian whiplash of Sir Hugo's tongue, I stole down the buried corridors and unlocked his room with a master key.

There's an art to searching a place without leaving spoor. I devoted myself to it for an hour, finding little. The forbidden papers were on a table by his couch: blueprints of the fuel-feed system, this time. Nearby was a stack of virgin sheets and a drafting board with its tools, so arranged that he could lie on the couch and make drawings—of what?

I had a rather grisly thought. Suppose the bomb was not a fake, after all. Suppose it would actually work—and we built one, and since we wouldn't be familiar with all the details, he could touch it off *here*.

But it didn't make sense! A complete atomic bomb represents the efforts of thousands of specialists. Sherman couldn't hold all that knowledge, not in one human skull.

(Martians? Homo Superior? Dismiss them; if that was the case, the game was already lost.)

No, I thought bleakly, the bomb must be history's most gigantic hoax, plausible enough to gain him the time he needed. And that time, at night, was spent sending to the enemy the data which American and British skill had piled up through laborious years. Learning all we had learned, as a free gift, the enemy could have our missiles built before we did.

No hidden wireless, no whispered messages, no copied papers passed from hand to furtive hand. Telepathy—

I looked at the calendar. In this summer of 1958 might befall the end of Earth's only civilization built on freedom under the law.

Concealment! He would be back soon. I went under the couch. It was dusty there, I wanted to sneeze. The gun seemed to glide of itself from my pocket to my hand.

If Sherman was sending to the enemy by telepathy, it would be hard to prove. But if he lay on this couch, in the typical trance, scanning the papers with blind blank eyes, that would be enough for me.

A key snicked in the lock. Almost, I jerked.

I saw only his feet. They moved wearily. I saw that the heels of his shoes were run down, and somehow that was infinitely pathetic. He locked the door behind him and shuffled across to the hotplate and started some coffee.

I waited. My belly muscles drew taut. It had been a long day, and now I would be spending the night beneath this settee, till he had gone again—dust was acrid in my nose, my eyelids drooped, I snapped them up with an effort.

He took his time, maddeningly. The smell of coffee was pure torment. He took off his clothes, donned pajamas and bathrobe; he lit his pipe and sat for a while reading.

An hour dragged. My watch glowed at me, it blurred . . . it was nearly midnight! Wasn't he going to do *anything?*

The slippered feet neared the couch. Sherman's weight forced the ancient springs down, one of them dug into my shoulders. I made myself flatter.

I heard him adjusting pillows, seeking a comfortable position. I heard the rustle of papers in his hands. He reached out and snapped down the electric switch, darkness thundered into the room. For a moment, only the whine of the ventilator talked.

Then he turned on a desk lamp which stood on his table. I judged it was focused on the papers, one spot of luminance in a world gone to night. I heard him muttering to himself, it sounded almost like an incantation . . . autohypnosis . . . get his mind into the right state . . . my own soul followed, willy-nilly. My head drooped, my eyelids weighed a ton. A crazy whirl went through my brain, the disconnected half-dreams of pre-sleep. *King's Cross and green hats and trees blowing in an April wind and the wide cosmos multiplied—*

". . . Are you there, my darling?"

I jerked awake. The voice snapped out of my consciousness.

Sherman lay quiet, speaking no more. Or had he spoken? It had been his voice, but somehow not his voice—no mere sound pattern could have carried that unlimited tenderness.

I stared stupidly at my watch. Enough light trickled down from the lamp to blot out its luminosity. But the face, the face, its numbers crawled and intertwined like snakes, I slid down a long black incline toward sleep.

". . . Hurry. No time to be human."

I saw the woman, I *saw* her, I swear. She was tall and blond, she wore a nightgown of almost indecent cut but she wore it naturally, as if she had never heard of another mode. She lay on a bed in a room where the only light fell on her hands. There were blueprints in her hands. The room smelt faintly of lavender.

". . . Why, my darling? There are hours until morning."

Sherman answered her, bleakly:

". . . Sir Hugo called me in. He wanted to know—they're getting suspicious. I shall have to give them something definite, or find myself arrested for treason. Do you need my data immediately?"

". . . Not yet. It can wait."

". . . Then I won't send you anything tonight—except all my love. I'll copy everything you have there. It should be enough to gain me a reprieve."

". . . It will take days to copy everything."

". . . Let me have the days, then! Every hour my countrymen are dying."

. . . (Our case is not so urgent. There is no open war yet. If you can give me what you know, and They —the chiefs, the officials, the blind blundering brass—can only be persuaded it's genuine, there may never be a war.)

". . . I hope not, O I hope not. If Thou wert to stand in the fire-sleet—"

". . . Here. Here is Sheet One.

Her face faded. White-on-blue intricacy rose before me. Somewhere, immensely removed, I heard the scratching of Sherman's pencil. He was copying, line for line, with a precision impossible to a waking man.

It was a mechanical thing. It took most of his mind, but not quite all, a thread of endearments wove between the hard lines. I would not want to live through such longing again.

And the hours went by. Somewhere above us the sun rose, and unshaven men on muddy earth heard artillery crash in disputed hills.

". . . That is the end for this night. I have to go."

". . . I, too. I hate the mornings!"

My brain crawled back to wakefulness.

Sherman lay for a while, breathing hard. Then, very slowly, like an old man, he got up.

I should, perhaps, have waited till he was gone. I had no authority to do otherwise. But hunches—there *are* people with a bit, just a bit of ESP. I had been able to listen tonight; I knew better, now, where my hunches came from.

Sherman went into the shower cubicle. I heard water rushing. It covered the small noise I made getting from beneath the couch.

When he came back, I sat there looking at his drawings.

He stood still for a moment.

"Where is she?" I asked.

"You were here." He said it in a dead voice.

"Yes." I ruffled the papers. "I see this is only a part of it. How long do you think it'll take to get the rest?"

He shambled toward me, his eyes were red and there was a twitching in one cheek. "What right did you have?" he whispered.

"Secret Service," I told him. "Your actions were pretty suspicious."

"In God's name," he screamed, "I'm going to win the war for you! I'll have the complete plans inside a week. It'll take perhaps three months to test everything and start production. In less than a year, the enemy will be smashed! Isn't that enough? Do you have to stick your filthy nose into my private life as well?"

"Sorry, old chap." I laid my gun on the table, but not too far from my hand. "I didn't like this job, but— Suppose you explain. If it satisfies me, perhaps my superiors won't have to know every detail."

"I didn't want them to know any part of it," he croaked. "Not just that it's . . . personal. But d'you think they'd have believed? They're none of them esp-sensitive."

"Right," I admitted. "You'd have been in the loony hatch long ago if— When did it start?"

Sherman sat down, listlessly, staring at his knees. "About a year ago. I was still experimenting with my ESP, don't you know, in what spare time I had—trying for clairaudience. I contacted her, mind to mind. It was just an occasional flicker at first. We only mastered the technique fully last month."

"And where is she?"

"In America. She's an American, the same as you and me. Only it's a different America, in one of my parallel universes. I suppose . . . I suppose knowing the mathematics of it helped me contact her . . . that, and a sort of autohypnotic state—"

"I fell three-fourths asleep under the couch," I said. "I, uh, listened in . . . couldn't help it . . . inductive effect? I seem to have a small degree of ESP myself, not as much as you but enough to— What kind of world does she live in?"

The knowledge had drained me of feeling. I could only speak dry words in a dry voice, like a man seeing the Grand Canyon by moonlight for the first time.

Something of life returned to Sherman. He couldn't hate me, not entirely, when I gave him the chance to talk about this thing which had been throttled inside him.

"It isn't very alien to our universe," he said. "The particles of the two Earths didn't assume a significantly different configuration till, oh, about one hundred eighty years ago. The death of George Washington by a sniper's bullet— But they're a free people there, too. English parliamentary democracy just *had* to evolve along much the same lines, whatever happened."

He sighed. "Still, there are some important variations. They're ahead of us in atomics, we're ahead in

rocketry. So don't you see, Harkness? Don't you see? I've been giving her data on our missile, and she's been telling me about their bomb. In *both* worlds, the free countries can have the ultimate weapon!"

I had no quick reply. I went instead to his coffeepot and started making up a brew. We needed it badly, with brandy.

"I believe you, of course," I said at last. "After hearing your thoughts —but it *is* a gross breach of security."

"How?" he protested. "They can't menace us, no matter what happens. I told you, my theory shows beyond doubt, that all physical interaction is impossible. Only the mind, which is not physical at all, can touch—"

And a poor devil can fall in love with a woman he can never have. But there was no reason to speak of that.

"Since I'd have only my bare word to support your story, we'd better spin a yarn which will satisfy the right people," I said. "Convince 'em you are a super-genius—that in some way your ESP work has completely integrated your conscious and subconscious minds. Yes, I think we can do it."

"I'll have me a time living up to that sort of reputation," said Sherman. "But what the hell?"

Over coffee, then, he told me what he had learned of this other Earth. It was an eerie thing to listen to. When I laid the histories side by side, I saw what a thin chain of accidents and miracles man's life must be.

Earth One: The American colonial revolution succeeded, American became a republic—minus Canada—and even fought on the side of Napoleon, 1812-14; later she had a civil war over the slavery issue, which Britain had settled more quietly, but still expanded to the Pacific and beyond. She became the refuge of discontented European liberals in the Nineteenth Century, an inspiration to the world. Meanwhile Germany was unified, and took Alsace-Lorraine from France in 1870, thus planting the seeds of the First World War, 1914-18, in which Russia went under and became a prey to Communism. America was a belated British ally in that war and in the second one, 1939-45, when an embittered Germany and a rampant Japan had to be defeated. Russia was on the Anglo-Saxon side then, but turned against the democracies immediately afterward.

Earth Two: The American rebellion collapsed soon after George Washington's death in 1778; but Lord North and his kind applied the lesson, colonial government improved until the Dominion of North America was created. With troops from the Western Hemisphere to help—as well as to overrun French and Spanish possessions nearer home— Napoleon was crushed by 1812 and monarchy was firmly reestablished. This left the Nineteenth-Century German liberals no place

to go, they stayed home and their influence speeded unification; there was a Franco-Prussian war in 1860, and a French *revanche* with British help in World War I, 1898-1904. It was that long and bloody a struggle because machine guns were available but not yet tanks and airplanes. By the same token, though, Russia was relatively less backward, survived the German onslaught but remained weak and corrupt. A devastated Germany went Communist, rebuilt, and the Second World War lasted from 1930-1935, till the Teuton fury was finally quenched. Russia, whipped by the Germans and under a puppet Red regime during the war, was easy game for Britain's Pacific ally, Japan, which grabbed off substantial Russian and Chinese territories. Afterward, an exhausted British Empire faced a vigorous Japan using the new tide of Asiatic nationalism as a lever against the white man.

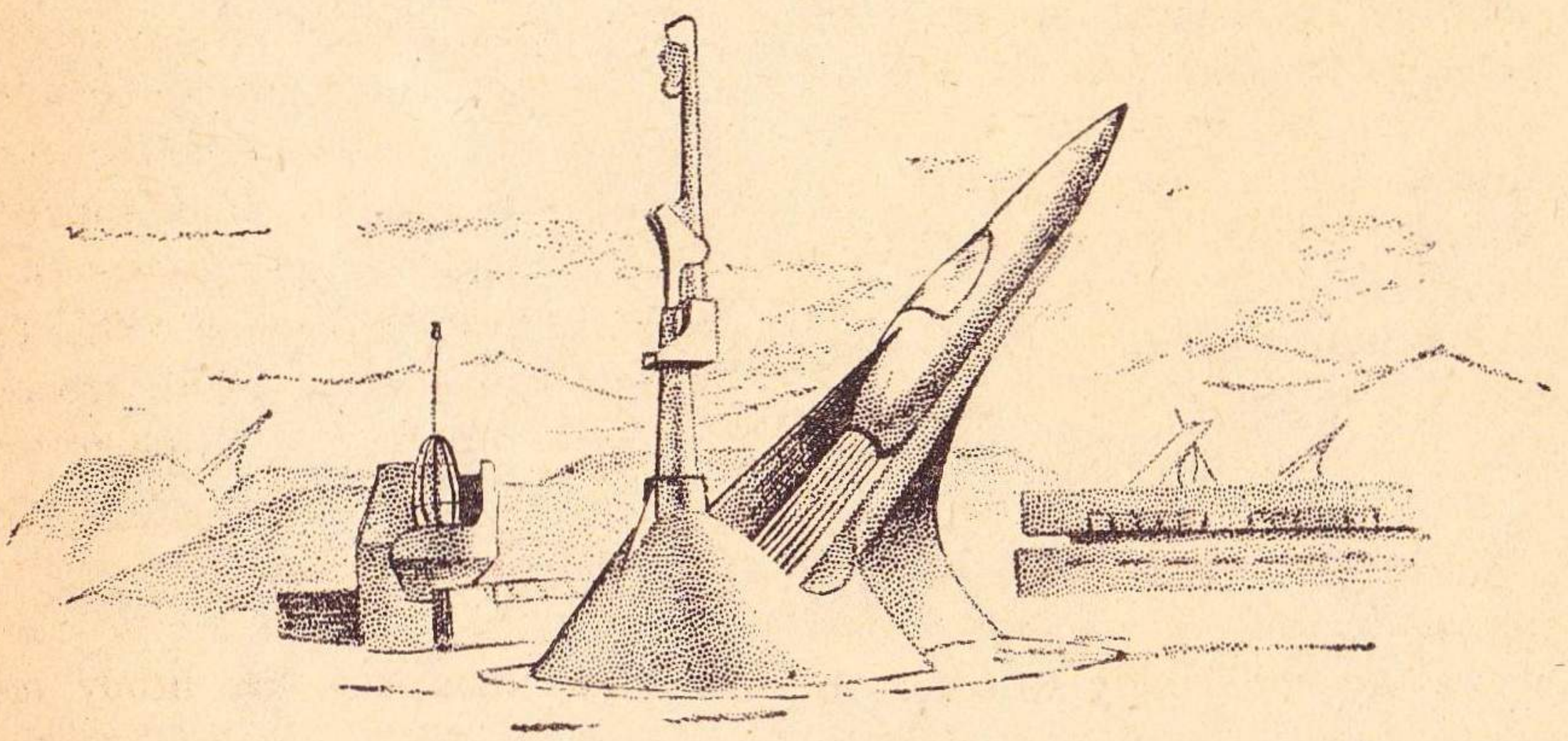
Yes, it made a grim kind of sense. Both histories did.

But strange to think that one world had already had its war with Japan and that Russia, the amiable bumbling Russian Republic, was the deadly Communist menace of its 1958, and in that world they could build a hydrogen bomb while the other played with uranium but stood ten years ahead in rocketry.

Security or no, it was a good bargain Sherman had made!

I bade him adieu for now and went upstairs. For a moment I stood in the doorway of the camouflage house, beneath the King's portrait. It was just sunrise and the Union Jack was being raised, brave above the hills of Kentucky.

THE END



It isn't the size, or even the danger, a mosquito represents that makes it so hard to settle down peacefully when one's in the room; it's the noise and the irritation. And a professionally trained irritator could be most distracting. . . .

Illustrated by Freas

NUISANCE VALUE

BY ERIC FRANK RUSSELL

The ship was small, streamlined and little better than junk. It lay uselessly in deep grass, its term of service finished and over. The name *Elsie 11* was engraved either side of its bow. There was no romantic connection, the cognomen being derived from L.C.2, or Long-range Craft Number Two. At its midpoint it bore the silver star of the Space Union and that meant nothing either—for it was now in enemy possession.

Also in the hands of the foe was the complete crew of seven, all Terrans. They posed in a lugubrious line, tired, fed up, deprived of weapons, and waited for someone to push them around.

Twenty Kastans stood guard over them while three others sought through the ship for anyone who might have remained in hiding. They were very humanlike, these Kastans, except in matter of size. The shortest of them topped the tallest Terran by head and shoulders. They ranged from seven and a half to eight feet in height.

The Terrans waited in glum si-

lence while big, heavy feet tramped through their stricken vessel from bow to stern. Finally an officer squeezed out the air lock, followed by two lesser ranks.

Strolling importantly to the group, the officer spoke to a Kastan whose left sleeve was adorned with three crimson circles. His language seemed to be composed of snorts and grunts. Next, he faced the prisoners and switched to fluent Extralingua.

"Who was in command of this ship?"

"I was," responded Frank Wardle.

"*Sir.*"

Wardle gazed at him cold-eyed.

"Say, 'Sir,' when you speak to me," ordered the officer, impatiently.

"What is your rank?" inquired Wardle, unimpressed.

The other put a spade-sized hand on a holster holding a huge machine-pistol. "That is no concern of yours. You are a prisoner. You will do as you are told—as from now."

"I will say, 'sir,' to an officer of superior rank," informed Wardle in the tones of one who knows his rights. "I will also accept his ruling as to whether or not that form of address is reserved only for military superiors."

Chronic uncertainty afflicted the hearer. Knowing his own superiors he could give a shrewd guess as to whose side they'd take in any dispute concerning their rights and privileges. The curse of being an officer is that one is outranked by other officers. Maybe he'd better let the matter drop, it being a dangerous subject to dwell upon. He glanced at the onlooking troops to see whether they were aware that he had been defied. Their faces were blank, uncomprehending.

Reasserting himself by making his tones harsh and authoritative, he said to Wardle, "I am not disposed to argue with a mere prisoner. You have plenty left to learn. And very soon you will learn it."

"Yes, teacher," agreed Wardle.

Ignoring that, the officer went on, "You will follow this sergeant. You will walk behind him in single file. You will be guarded on both sides and in the rear. If any one of you attempts to escape the escort will shoot—to kill. Do you understand?"

"I do."

"Then so inform your companions."

"There is no need. They understand Extralingua. On Terra one gets educated."

"Also on Kasta," the officer riposted, "as you are about to discover." He turned to the sergeant. "Take them away."

The crew of the *Elsie* marched off, obediently following the sergeant. Three guards on either side kept pace with them at ten feet distance, just too far for a sudden jump and a successful snatch at a gun. Four more trudged weightily behind.

They struck a wide path between

enormous trees and moved in contemplative silence. A thing like a small frilled lizard scuttled along a branch fifty feet up, stared down at them beady-eyed and uttered a few sympathetic squeaks. Nobody took any notice.

The sergeant's yard-wide shoulders swung in front of them while his size twenty boots went *thud-thud-thud.* There was no difficulty in keeping up with him because his slow pace compensated for his great strides. The escort's boots also thudded on the right, the left and in the rear. The Terrans felt like pygmies trapped by elephants in human form.

Eventually they reached a small encampment consisting of half a dozen huts set in a clearing. Here, the seven were herded into a truck, a troop-carrier with seats along both sides. They sat in line on one side, their feet dangling a few inches above the floor. The guards squatted on the other, machine-pistols in laps.

The truck roared to life, pulled out, rocked and swayed along a dirt road, reached a wide, paved artery, sped at top pace for three hours. During this time the Terrans said not a word but their eyes absorbed the passing scenery as though memorizing it for all time.

With a sudden turn to the right that shot the prisoners onto the floor the truck lumbered into a military center and stopped before a long stone building. The guards guffawed deep in their chests, nudged the struggling captives with their boots. A bunch of uniformed Kastans gathered around and gaped curiously as the Terrans dismounted and were conducted inside.

The sergeant lined them up against a wall, snorted and grunted a few warning words to the guard, hastened through a doorway. After a while an officer stuck his head out the same doorway, surveyed the silent seven and withdrew. A bit later the sergeant reappeared, urged them along a high-ceilinged corridor and into a room in which two officers were seated behind a long desk.

For twenty minutes the officers fiddled around with papers and pointedly ignored the arrivals. That keep-'em-waiting technique was deliberate and of malice aforethought, being calculated to impress upon the prisoners that they were trash to be swept up at leisure.

Finally one of the officers looked up, made a grimace of displeasure, pushed his papers to one side. He nudged his companion who also condescended to become aware of alien company.

"Who speaks Kastan?" asked the first officer, in that language.

No reply.

"Well, do any of you speak Extralingua?" he persisted.

"They all do, sir," chipped in the sergeant without waiting for anyone else to reply.

"So! Then let's get on with the interrogation."

He pointed a pen at random. "You there—what's your name?"

"Robert Cheminais."

"Number?"

"105697."

"Rank?"

"Captain."

The second officer scribbled all this on a sheet while the pen shifted and aimed at the next one.

"And you?"

"William Holden."

"Number?"

"112481."

"Rank?"

"Captain."

Another move as the pen selected the third one.

"Frank Wardle. 103882. Captain."

Then the rest in rapid succession.

"James Foley. 109018. Captain."

"Alpin McAlpin. 122474. Captain."

"Henry Casasola. 114086. Captain."

"Ludovic Pye. 101323. Captain."

"Seven captains on one ship," commented the officer. He let go a loud sniff. "That's the way the Terrans run their navy. Everyone a captain—if he isn't an admiral. And doubtless every one of them has forty medals." His sour eye examined the captives, then picked on Wardle. "How many medals have *you* got?"

"None—yet."

"Yet? You've a fat lot of hopes of getting one *now*. Not unless we give you one, having become crazy." He waited for an answer that did not come, went on, "But you are a captain?"

"That's right."

"And all the others are captains?"

"Correct."

"Then who commanded the ship?"

"I did," said Wardle.

"In that case," rasped the officer, "you can tell me something. You can tell me exactly why you're here."

"We're here because we've been made prisoners."

"I know that much, fool! I want to know why a Terran vessel has appeared in this locality where none has ventured before."

"We were on a long-range reconnaisance patrol. Our engines went haywire, propulsion became dangerously erratic, we were forced down. Your troops grabbed us before we could make repairs." Wardle gave a shrug of complete resignation. "Our luck ran out. That's war."

"Your luck ran out? Seems to me that you were let down by inferior equipment. Our space-navy would not tolerate that sort of thing. Our standard of efficiency is pretty high." He gazed steadily at his listener, continued, "Experts are on the way to examine these Terran engines. I don't suppose they'll discover anything worth learning."

Wardle offered no remark.

"So you were on a spying trip, eh? It hasn't done you much good, has it?"

No answer.

"We've a very useful labor force of four hundred thousand Union prisoners. The addition of seven Terrans won't make much difference one way or the other. You are undersized and puny creatures." He studied each of the seven in turn, his lips pursed in contempt. "However, we shall add you to the crowd. In time of war every little helps—even a bunch of weak-muscled captains." He turned to the stolidly listening sergeant. "Have them shipped to Gathin forthwith. I will forward their papers immediately we've dealt with them here."

He made a gesture of dismissal. The sergeant led the seven back to the truck, chivvied them aboard, took a seat facing them with the guard beside him, guns in laps. The truck lurched ahead, got onto the main road, hit up top speed. Its axles emitted a high-pitched whine.

Holden, hawk-nosed and lean-faced, bent forward, said to the sergeant in Extralingua, "Where's Gathin?"

"Up there." The other jerked a hammerlike thumb toward the sky. "Twelve days' flight. Anthracite mines, lead mines, machine-shops. Plenty of work for the dead." He showed big teeth. "Those taken in war are as dead. Therefore one should not be taken."

"Do you understand Terran?" asked Holden, switching to that language.

The sergeant looked blank.

Radiating a cordial smile, Holden said, "You dirty big stinking bum! Hail the Union!"

"Please?" said the sergeant, answering the smile with a cracked one.

"You flatfooted, hamhanded numbskull," responded Holden, oozing amiability. "May all your children have violent squints and may you be smothered to death in a heap of manure. Hail the Union!"

"Please?" repeated the sergeant, baffled but gratified.

"Take it easy, Bill," warned Wardle.

"Shaddap!" Switching back to Extralingua, Holden said to the sergeant, "I will teach you a little Terran if you wish."

The sergeant approved, thinking that every item of education was a step nearer to officership. Lessons commenced while the truck rocked along. Prisoners and guards listened with interest as Holden carefully enunciated words and phrases and the sergeant got them perfectly.

Such fluency had been gained that at the spaceport farewells were exchanged in the specified manner.

Holden, giving a vaudeville salute, "Drop dead, you fat rat!"

The sergeant, proud of his linguistic ability, "Thank you, my lord! Hail the Union!"

They trudged down the ship's gangway, stared at their new surroundings, and Wardle said in an undertone, "Item one: we've arrived without getting our throats

slit. Item two: we now know exactly where Gathin is."

"Yair," agreed Holden. "We know where it is. But it's going to be easier to get in than get out."

"Oh, I don't know," opined Wardle, airily. "We've got a considerable advantage in that they won't expect us to try. Remember, chum, it's a cosmos-wide convention that a prisoner of war is a member of the living dead, properly resigned to his fate. Everyone recognizes that fact excepting Terrans --who are wholly crazy."

"Not all Terrans had that viewpoint once," offered Holden. "Around the time they learned to walk on their hind legs the Japanese considered capture more disgraceful than death. Some went so far as to commit suicide first chance they got."

"That was a heck of a long time ago and—"

"Silence!" bawled a paunchy Kastan who was standing near the bottom of the gangway with the inevitable guard in attendance. He glowered at the seven as they lined up in front of him. "So you are Terrans, eh? We have heard your kind mentioned by the Stames and Aluesines who"—he put on a grin of self-satisfaction—"are now our slaves by right of conquest. But they did not say you were so small. Or have we been sent a group of selected dwarfs?"

"Seven dwarfs, sonny," said Holden. "Snow White's coming on the next boat."

"Snow White?" The paunchy one frowned, consulted a wad of papers in his hand, searching through them one by one. "I have here documents for seven Terrans. There is nothing about an eighth due on this ship or the next."

"She must have missed it," said Holden, helpfully.

"*She?* You mean a female was captured with you?"

"Evidently she wasn't. She took to the woods." Holden put on a look of grudging admiration. "I wouldn't have thought she'd have got away with it."

Paunchy took a deep breath. "Did you inform our Interrogation Center about this Snow White?"

"No, sonny. They didn't ask."

"Imbeciles!" he spat out. "Now we shall have to send a signal to Kasta and set up a widespread hunt for her. It will put our forces to much time and trouble."

"Hallelujah!" said Holden, fervently.

"What does that mean?"

"It is much to be deplored."

"You are right," agreed Paunchy, with some menace. "And in due course she will do much deploring." His eyes shifted along the rank, settled on Ludovic Pye. "Well, what are you laughing about? Is your brain afflicted?"

"He suffers from hysterics," put in Holden. "It is the shock of capture."

"Humph!" said Paunchy, openly contemptuous. "Weak in mind as well as in body. The Aluesines and

Stames have more moral fiber, low-grade lifeforms though they be. They collapse from physical weakness but none have gone mad." He spat on the ground, vigorously. "Terrans!" Then he motioned toward a nearby truck. "Get in!"

They got in. It was the same procedure as before. They sat along one side with a line of surly guards facing them. The truck set off through a countryside different from that of Kasta. Here, trees were smaller though still big by Earth-standards. They grew more thickly and soon resembled a jungle through which the road cut in a wide, perfectly straight line.

Halfway to their destination they passed a gang of Aluesines toiling at the roadside. They were human-shaped characters nearly as tall as the Kastans but of skinnier physique. They had slot-shaped pupils, like cats, and by nature were nocturnal. Only they could know the torture of slaving in full sunlight.

The Aluesines observed the Terrans without interest or surprise. Every one of them had the appalling apathy of a creature resigned by custom to his fate and who takes for granted a similar attitude on the part of all others.

Holden, who was seated near the tailboard, leaned over it as the truck roared past and let go a yell of, *"Floreat Aluesia!"*

It caused no visible excitement. A guard leaned forward and belted Holden on the knee with his gun-butt.

"Fosham gubitsch!" he growled in incomprehensible Kastan.

"Hush yo mouf!" said Holden in equally incomprehensible Terran.

"Shut your own!" ordered Wardle. "We'll have trouble enough before we are through."

"You will not talk in dwarf-language," chipped in Paunchy, cutting a scowl into seven parts and handing a piece to each. "All speech will be in Extralingua. That is, until you have learned Kastan."

"Hah!" said Holden, determined to have the last word.

The officer was big even for one of his race. He wore a skin-tight uniform of dark green ornamented with silver braid. A couple of small white arrows decorated the flap of his top pocket. His face was broad, heavy and slightly gross, his expression severe.

"I am the commander of this prison. Over you I hold the power of pain and suffering, of life and death. Therefore you will strive to please me at all times. Henceforth that is your only aim, your sole purpose of existence—to please me."

The seven stood in silence as he did a bit of important strutting up and down the carpet.

"We have not had any Terrans before and now that we have I don't think much of them. All the same, we shall make full use of such work as you are capable of doing. That is our proper reward for victory

and your proper penalty for defeat."

Holden opened his mouth, closed it as Wardle's heel rammed down on his toes.

"You will be conducted to your quarters," concluded the officer. "In the morning you will be cross-examined concerning your training and aptitudes. You will then be assigned appropriate tasks." He sat down, leaned back in his chair, put on an expression of boredom. "Take them away, sergeant."

They were marched out in single file, made to wait an hour in the middle of a great concrete yard. Barrack-blocks of solid stone reared ten floors high on each side of the yard. Beyond the blocks rose the wall to a height of sixty feet. The whole place seemed empty, there being no other prisoners in sight.

Eventually a guard-major appeared, took over from the sergeant, led them into the right-hand block and up stone steps to the sixth floor. Then along a corridor and into a large room with bare stone walls.

"Do you understand Kastan?"

They stared at him without response.

"Extralingua?"

"Yes," said Wardle, speaking for the bunch.

The guard-major drew himself up to full height, expanded his chest and gave forth. "I am guard-major Slovits. I command this block. Over you I hold the power of life and death. Therefore you will strive to please me at all times."

"Henceforth that is your only aim," prompted Holden.

"Eh?"

"I was remarking that we understand," explained Holden, blank-faced. "Our only aim shall be to please you, Guard-Major Slobovitch."

"Slovits," corrected Slovits. He carried on, "You will remain here until the great gong sounds outside. You will then parade in the yard along with the others for your evening meal. Is that understood?"

"Yes," said Wardle, beating the gabby Holden to any further remarks.

"There will be no jostling of other prisoners, no unruly fighting for food. Disorder will be cured with the whip. Is that understood?"

"Yes, Guard-Major Slobovitch," assured Holden, beating Wardle out of his role as spokesman.

"Slovits!" said Slovits, glowering at him. He stumped out, slamming the door behind him.

Wardle prophesied to Holden, "One of these days you'll be trapped by your own trap."

"That's happened already. I volunteered for this nutty mission, didn't I?"

"You did. Let it be a warning to you."

There were twelve beds in the room, each consisting of plain wooden planks fastened to a wooden framework. The beds were nine feet in length and covered with one nine-foot blanket slightly threadbare

and none too clean. At the end of the room was a faucet and one wash-basin.

"Every modern inconvenience," growled Foley, to whom the chief curse of military service was lack of comfort.

"Twelve beds," observed Alpin McAlpin. "I wonder if that means we're getting some Stames or Aluesines with us. If so, it'll make contact easy right at the start."

"We'll have to wait and see," said Wardle. He strolled to the door, tried it. The door held firm. "Self-locking and solid metal. Hm-m-m! Wouldn't have surprised me if they'd left it open."

He crossed to one of the four windows. There were no bars to impede exit. The windows were hinged and opened without trouble. A baby elephant could have clambered through and escaped—given that it had been born with wings.

The others joined him for a look-see. Immediately beneath them the side of the block dropped six floors to the ground. Above, it rose four to the top. There were no ridges, no ledges, no breaks other than those provided by window-gaps.

At bottom lay a concrete space of bone-breaking hardness, forty feet wide, terminated by the outer wall. Evidently they'd been accommodated on the side of the block farthest from the yard, though whether or not this would prove an advantage remained to be seen.

The great exterior wall of the prison soared a full sixty feet from ground, its top being a couple of feet below the floor-level of their room. Thus they could look down upon the top, also see much of the country beyond.

As nearly as they could judge from their vantage-point the wall's top was about five feet wide. On each side one foot of this width was fringed with a triple row of metal spikes about six inches long and spaced three inches apart. The middle three feet formed a sentry-walk along which armed guards mooched from time to time with their attention directed mostly outward rather than inward.

Foley said to Holden, "Now there's a choice set-up for knocking them off the easy way."

"How d'you mean?"

"You call the attention of a sentry from here. He looks this way, sees your horrible face. He faints at the sight of it, collapses on the spikes and gets impaled."

"Wittiest speech I've heard in years," said Holden, sourly. "Look at me rolling all over the floor."

"Shut up, you bums," ordered Wardle. He left the window, sat on the edge of a bed, counted off his fingers as he continued talking and made his points one by one. "Let's review the situation."

They assented, sat around and listened.

"The know-alls on Earth said the Union is handicapped by an alien psychology which applies to enemies and allies alike. In this respect

we Terrans appear to be unique—though someday we may encounter a yet unknown lifeform that uses what we regard as hoss-sense. Correct?"

They nodded.

"All right. This alien viewpoint asserts that to be taken prisoner is to be eternally disgraced. Even a released prisoner refuses to go back home; his family prefers to consider him dead for keeps rather than admit the shame of him. So there's no point in any prisoner attempting to escape except for the purpose of committing a nice, quiet, uninterrupted suicide. That gives us an advantage in dealing with enemies —but it's a hell of a handicap to our allies. Eh?"

Again they nodded.

"The Stames' and Aluesines' casualties consist only of killed and wounded. Officially there are none missing. So they've a powerful army here which, they say, does not exist." He paused, added, "And they say Terrans are crazy!"

"If we aren't," put in Holden, "why are we here?"

Taking no notice, Wardle went on, "The know-alls promised that we'd find ourselves in circumstances shaped by the enemy's unavoidable supposition that we would never dream of escaping for any purpose other than that of self-destruction. They said, for instance, that we'd be searched for weapons and documents but not for escape material. So far, they've proved right, haven't they?"

"Yair," said Holden, feeling around for a pocket-watch that wasn't a pocket-watch.

"They said that all the enemy would demand of us would be absolute obedience because the only problem he has in dealing with captives is that of reluctance to work. Naturally a gump who considers himself dead isn't going to sweat any harder than he has to. So the Kastans have never experienced any trouble with prisoners other than of two kinds, namely, slow working and occasional suicides. They've never come up against ridicule, sabotage, organized escapes or suchlike. Not sharing our state of mind, they don't and can't anticipate any difficulty in handling a few Terrans." He stopped, rubbed his chin thoughtfully and asked, "Do you fellows think the way we've been handled so far shows that the know-alls were again right?"

"Yair," said Holden, the others agreeing with him.

"Good! Then what we've got to do next is check up on whether they're correct about everything else because, if not, we're in a real jam —and we could remain in it until death us do part."

He counted another finger as he made the next point. "The bigbrains claim that Kastan prisons should be fully as well-built as any of ours but with one significant difference: defences will be against attack from outside rather than mass es-

cape from inside. The Kastans expect the former but not the latter, taking it for granted that the Union's motive would not be to release their own men but rather to rob the Kastan economy of a valuable labor force."

"It's all a lot of long-range supposition," put in Alpin McAlpin. "I wouldn't take any Kastan's mentality for granted on the strength of some Terran expert's guesses. We've a lot of checking-up to do before we know where we're going."

"That's what I'm getting at," said Wardle, staring hard at Holden. "Let's be humble and obedient for a while. Let's become willing and patient beasts of burden while keeping our eyes skinned for confirmatory evidence. From now on we'll confer every night and correlate whatever data we've gathered."

"Why give *me* the hard eye?" demanded Holden, bristling at him.

"You're a bit too full of bounce, chum. You're supposed to play a part and you're a bad actor."

"Nuts to that! I consider myself a cut above these Kastans, having been conceived in holy wedlock."

"So do we all. But we must conceal the fact for as long as seems expedient. Good manners is the art of pretending that one is not superior."

Foley let go with a violent laugh at that, and said, "You're like a troop of Tibetans."

"Why?" asked Wardle.

"You're always good for a few yaks."

A huge gong clamored somewhere across the yard.

"Food," added Foley, starting the line-up by the door. "Prison food. Let's see you laugh this lot off."

The door clicked open, they went through into an empty corridor, clattered down the stairs and into the yard. Here a guard met them, handed each man one circular wooden bowl and one wooden spoon.

"You will keep those and take care of them. Loss or damage will earn punishment." He pointed across the concrete, his forefinger the size of a banana. "At all mealtimes you will attend with those Stames. You will not join any of the other groups unless ordered to do so."

They traipsed across the yard, tagged on at the end of the indicated line of Stames. Ahead of them the line wound snakelike a couple of hundred yards, went through a gap between barrack-blocks and round to the cookhouse at back. Nearby were four other lines slowly shuffling forward, one wholly of Stames, two of Aluesines and one of mixed species.

The Stames also were humanlike, towering head and shoulders above the Terrans. This unanimity of shape surprised nobody. Every intelligent lifeform yet encountered had been found only on planets approximating more or less to Terra's conditions, and every one had been of the same shape with no more than minor variations. A library of books had been written on the subject, with such titles as *Cosmic Domination of the Simian Structure.*

The similarities served to emphasize the differences. The Stames were first-class fighters in their own area but not aggressively warlike as were the Kastans. They were not nocturnal like the Aluesines. They lacked any appreciation of the ludicrous such as is enjoyed by Terrans. They were a serious-minded, humorless lifeform, producers of broody literature and moody music.

Holden nudged the one immediately in front of him. The Stame turned round, looked down upon him from his greater height. He had a mournful face, a lugubrious expression, and resembled a founder-member of the Society of the Disenchanted.

"How's the chow here, Happy?" asked Holden.

"Little and bad."

"It would be."

"So now they are taking Terrans," commented the Stame. "They have progressed that far, *houne?* The war is almost lost, *houne?*"

"What do you care? You've been thrown to the crocodiles, anyway."

"Crackodales? What are those, please?"

"Kastans wearing a grin," informed Holden. "But don't quote me."

The line edged onward. More Stames appeared, joined in behind the Terrans. They did not speak unless spoken to. Every one of them was thin, under-nourished, dull-eyed

and apathetic. Stames and Aluesines in parallel lines were in no better condition. Their clothes were worn and shabby. A third of them lacked boots or shoes and trod the concrete bare-footed.

At the cookhouse forty impassive Aluesines stood in pairs beside twenty big, steaming boilers and ladled out the contents under the sharp eyes of as many guards. One scoop just about filled one bowl.

Holden, first in the Terran file, got his, examined it closely, smelled it, rasped, "What is this foul potion?"

A guard eyed him. "You say?"

"I say it's a crying shame, you lumbering clunker."

"You will speak only in Extralingua," reproved the guard. "To use your own language is forbidden."

Carrying their bowls clear of the several line-ups, they followed the example of those already served, sat on the hard surface of the yard and ate. Plying their spoons they dipped and sucked in unison. The concoction tasted like mixed vegetable soup. Unidentifiable portions of stuff floated around in it and to Terran nostrils it had the fragrance of the cathouse at the zoo.

Without enthusiasm they finished the stew, washed spoons and bowls under a faucet, hung around to see what next. Nothing much happened for a while. Prisoners who had been fed lolled listlessly around the yard while those yet to be fed shuffled forward with bowls in hands. As the last few of the latter reached the cookhouse a strange stirring, a kind of subtle animation went through the crowd. Tenseness could almost be felt.

Then behind the block a guard bawled something unhearable. Immediately a mob of prisoners made a mad rush to the cookhouse. There came noises of scuffling feet, shouted orders, Kastan curses and cracking whips. Soon the mob mooched back.

One of them, a weary-eyed Aluesine, sat near the Terrans, tilted his bowl to his mouth and drank greedily. Then he sighed, lay back propped on his elbows, looked idly around. His clothes were black with anthracite dust and a fresh weal showed across his face.

Wardle edged across to him, asked, "What caused the fracas?"

"Extra," said the other.

"Extra?" Wardle was puzzled. "Extra what?"

"Soup," said the Aluesine. "Sometimes after all have been served there is a little left over. So the guards give a shout. First comers get it, just a mouthful apiece."

"And for that you ran like an animal?"

"We are prisoners," reminded the Aluesine, with dreadful philosophy. "A prisoner is no more than an animal. What else can he be?"

"A warrior," snapped Wardle.

"What, without a gun and without honor? You speak stupidly."

He got up and walked away.

"Hear that?" Wardle glanced at the others. "It shows what we're up against."

"Hell of a note," said Holden, disgustedly.

"We mustn't condemn them," Wardle warned. "They think the way they've been brought up to think and the result isn't their fault. Besides, the Aluesines are having a hard time. They work when they ought to be sleeping and they try to sleep when normally they'd be active. Their nature is being turned upside-down. I'll bet that character feels like he's on his last lap."

"The Stames aren't having it good either," put in Ludovic Pye. "I've just had a word with that one." He pointed to a distant mourner following an invisible coffin. "Says he's been here four years, worked like a dog, and hasn't tasted meat since he bit his tongue."

"Well, we've another small advantage," Wardle commented. "The Kastans are doling out their lousy food on the basis of the minimum quantity needed to maintain useful life in people half as big again as ourselves. They're giving us the same as the rest. So in proportion to our requirements we're getting more than the others. We'll be only a quarter starved instead of half-starved."

"With all the numerous advantages we've got or are alleged to have," remarked Pye, sarcastically, "it's a wonder the Kastans don't give up."

"They will, chum, they will," Holden told him.

Heaving himself erect, Wardle said, "Let's make some sort of a start while the going is good. Split up and work individually around the yard. Question anyone who's got a spark of animation and see if we can find out who is the senior officer among this crowd."

They went their several ways. Holden was the first to pop the question. He picked upon a Stame one degree less miserable than the rest.

"Who is the senior officer in this dump?"

"The Kastan commander of course. You were taken before him when you arrived, weren't you?"

"I don't mean Festerhead. I mean who is the senior officer among the prisoners?"

"There are no officers."

"That so? Were they all sent elsewhere?"

"There are no officers," asserted the Stame, as if speaking to an idiot, "because a prisoner has no rank. We are all prisoners. Therefore there are no officers."

"Yair," said Holden. "That's right."

He scowled, gave up the search, but ambled aimlessly on. Presently he met Casasola, the silent one who was heard when and only when speech was unavoidable.

"No ranks, therefore no officers," Holden said.

Casasola pulled a face and walked

onward without remark. Next came Foley.

"No rank, therefore no officers."

"You're telling me?" said Foley disgustedly, and continued his futile questioning.

In short time Holden became bored. Selecting an unpopulated corner of the yard, he sat down cross-legged, placed the bowl between his knees, hammered it with his spoon to attract attention and let go with a peculiar whine.

"No momma, no poppa. Have pity, Sahib. Baksheesh in the name of Allah."

"You will not talk in dwarf-language," ordered a voice situated high above size twenty boots.

Holden looked upward. "Oh, good evening, Guard-Major Slobovitch."

"The name is *Slovits,*" shouted Slovits, showing horse's teeth.

Nobody shared their room when the door clicked shut for the night. The five spare beds remained unoccupied. Wardle eyed the beds speculatively.

"Either this pokey isn't yet full to capacity or else they're keeping us apart from the rest night-times. I hope it's the former."

"Does it matter?" asked Pye.

"It might. If they're segregating us within the block it could be because they know more about Terrans than we think. By the same token they could know too much about our military tactics. I like an enemy to be big, clumsy and ignorant."

"They can't know much," scoffed Pye. "They're numerically the strongest lifeform yet known, and they control some sixty scattered planets, but their intelligence service has never probed as far as the Terran sphere of operations. The Kastans have been spending all their time fighting Stames and Aluesines and lesser types; up to when we left home they'd heard of us only by repute." He gave a sniff of disdain. "Bet they've crawled all over *Elsie* and think she's the best we've got."

"What, you dare to speak lightly of a woman's name?" interjected Holden, pretendedly shocked.

"Anyway," continued Wardle, "we now know that the experts have proved correct about imprisoned allies and have weighed them up fairly accurately. It's obvious that not one of these prisoners would lift a finger to get back home. He knows that if he did return he'd be scorned by the populace, denied a living, repudiated by his family and become a social outcast. He's no inducement to make a break."

"Not yet," said Holden.

"No, not yet. Our experts think they've found a way to crack the hard crust of alien convention, to the great advantage of the Union and the confoundment of the Kastans. We've got to make it work. We've now had a close look at the set-up—what do you fellows think of our chances?"

"Too early to judge," Holden

opined. "We can make some better guesses after another week."

"I thought they were exaggerating back on Terra," ventured Pye. "But they weren't. Not one little bit. We're expected to perform miracles with a mob of exhausted zombies. It's a tough task, in my opinion."

"That's because you're letting yourself be bemused by their alien viewpoint," said Wardle. "The more baffling you permit it to seem, the harder the job looks. Try simplifying it in your own mind."

"How d'you mean?"

"This way: basically the Stames and Aluesines are topnotch fighters, full of guts and ready for anything —so long as they've got guns in their hands and retain what they choose to regard as personal honor. Take away their guns and kick them in the britches and you destroy that honor. So they are bollixed by what is, in effect, a tribal custom that's been established for many centuries."

"But it doesn't make sense."

"Neither do some of our habits. Maybe it did make sense in the long, long ago. Maybe it was a natural and necessary way of eliminating the weak at a time when explosives and paralyzing gases weren't thought of. Anyway, the only real difference between these prisoners and ourselves is that we can be stripped naked and still retain an item of which they are deprived."

"Such as?"

"An invisible something called morale."

"Humph!" said Pye, unimpressed.

"Either a prisoner has it or he hasn't," Wardle went on. "This mob has not got it and it isn't their fault. They've been kidded by long-standing custom into believing there's no such thing. Or rather I should say they've been made blind to it. What we've got to do is help them see clear and straight."

"I know all that," Pye grumbled. "But once I spent five years on Hermione. As maybe you know, the Hermies have good, sharp sight but see only black, white and shades of gray. They're not to blame for that; it's the way they're made. You can argue with them from now to the crack of doom and never succeed in describing colors or telling them what they're missing."

"So what? We aren't here to try give the Stames and Aluesines something mysterious that they've never had. Our concern is to restore something they've lost, something they had aplenty when their guns were loaded and in their hands. It may be difficult. It isn't impossible."

"What does that mean?" inquired Holden.

"What does *what* mean?"

"Impossible?"

"Forget it," advised Wardle, grinning. "There is no such word."

Holden leaned across toward Pye and said in tutorial manner,

"You heard what the nice gentleman said—there is no such word."

"Humph!" repeated Pye, determined to coddle his mood of temporary skepticism.

Wardle ambled to a window and looked out. Darkness had fallen, the purplish sky was sprinkled with stars. A pale primrose glow rippled across the landscape as one of Gathin's three minor moons arced overhead.

The top of the prison wall was illuminated by narrow-beamed flares directed horizontally along it. Apparently the sole purpose of the lighting was to make clear the path of patrolling sentinels lest otherwise they should step on the spikes and take a sixty-foot dive.

"We must time the movements of these guards," said Wardle. "We'd better take turns at keeping watch on them. As soon as possible we must acquire precise details of their nightly routine."

"We must also dig up a small crate from somewhere," Holden put in, "or, better still, a three-foot folding ladder."

"What for?" demanded Wardle.

"Sooner or later we may have to slug one of them. The slugger will need a ladder to lay out a chump eight feet tall. Takes brains to think of everything." Selecting a bed, he sprawled on it, glanced sidewise, met the gaze of the ever-silent Casasola. "So you're still with us, eh? Just a rose in a garden of weeds."

Casasola did not deign to reply.

Came the dawn. It was sweetened by the majesty of Guard-Major Slovits. He flung wide the door, marched in, prodded each blanket-covered shape with his whip-handle.

"You will dress at once. You will go for your morning food. Immediately you have eaten you will parade outside the commander's office." He distributed a few more impartial jabs. "Is that understood?"

"It is," said Wardle.

Slovits marched out. Foley rolled over, groaned, sat up, rubbed red-rimmed eyes.

"What did he say?"

"In effect, get moving," Wardle informed.

"After breakfast we're invited to drinks with Festerhead," Holden added.

"Like hell we are," said Foley. "What's Festerhead want us for, anyway?"

"I'll tell you for a small fee," offered Alpin McAlpin.

In due time they reached the head of the line-up and received one quart apiece of cat-house soup. They sat on the ground and ate.

"Good, *houne?*" remarked a nearby Stame, as though guzzling the stuff was the only remaining joy in life.

"Think so?" Foley scowled at him. "I say it stinks."

"An insult to the belly," offered Cheminais in support.

"Not fit for hogs," declared Ludovic Pye.

"Down, down, you mutinous dogs!" bellowed Holden at the top of his voice.

Ten thousand pairs of eyes turned simultaneously their way, ten thousand wooden spoons poised motionless over as many bowls. A dozen guards raced toward the center of general attention.

The first of them arrived and demanded breathlessly, "Now, what is this?"

"What is what?" said Holden, childlike and bland.

"You have screamed. Why have you screamed?"

"I *always* scream two hours after sunrise on Thursdays."

"Thursdays? What are those?"

"Holy days."

"And why do you scream then?"

"It is my religion," assured Holden, oozing piety.

"A prisoner has no religion," stated the guard, with considerable emphasis. "There will be no more screaming."

He stamped away impatiently. The other guards went with him. Ten thousand pairs of eyes lost interest, ten thousand spoons resumed scooping at as many bowls.

"That mug," said Holden, "is so dumb he thinks fuller's earth is a planet."

The nearby Stame glanced warily around, whispered in confidential manner, "I will tell you something. All Terrans are crazy."

"Not all of us," Wardle denied. "Just one of us. Only one."

"Which one?" asked the Stame.

"Not telling," said Holden. "It's a military secret."

"Prisoners have no secrets," said the Stame with much positiveness.

"*We* have!" Holden sucked soup loudly. "Good, *houne?*"

The Stame got up and walked away. For reasons best known to himself he was slightly dazed.

"Is this your idea of behaving quietly and humbly for a piece?" asked Wardle. "If so, what's going to happen when we decide to get uppish? Were you ever a juvenile delinquent?"

Holden finished his soup, then, "Obedience has its limits so far as I'm concerned. Besides, we're fighting a state of mind. It's a mental condition that sticks in my craw. The sooner we cure them of it, the better."

"That may be. But we've got to be careful we don't overreach ourselves by starting off too fast. We've got to show these Stames and Aluesines that victory and self-respect can both be gained. It won't help us any if they explain all our words and deeds in terms of lunacy."

"Neither will it help us to mope around kowtowing to all and sundry."

"Have it your own way," said Wardle, giving up.

The Stames and Aluesines started forming in close-packed columns and marching out through the main gate. They still carried their bowls and spoons. None bore tools, these

presumably being stored at wherever they labored. Guards chivvied them continually as they trudged along, urging them to move faster. Several who stumbled and fell out of the ranks were promptly booted back into place.

Meanwhile the Terrans paraded as ordered outside the commander's office. A great Kastan banner flapped and fluttered from its pole above the building. Holden watched the flag, seemingly fascinated by its movements.

They were still waiting when the last of the working parties left the yard and the big gates clanged shut. Now the space was empty, the barrack-blocks deserted. There were no sounds other than the thump of boots along the wall-top, the receding shouts of guards accompanying the columns and vague noises in the distance where other slaves already had resumed their daily tasks.

After they had fidgeted aimlessly around for more than an hour, Slovits appeared. "You will come inside and answer all questions."

They traipsed in, found themselves facing five officers of whom the middle one was the prison commander. All five had the bored attitude of farmers about to compile the milk records of a herd of cows.

"You," said Festerhead, pointing. "Which one are you?"

"Alpin McAlpin."

"In what have you been trained?"

"Radio communications."

"So you are a technician?"

"Yes."

"Good!" approved Festerhead. "We can use skilled personnel. Far too many of these Union captives are common soldiers fit for nothing save drudgery." He conferred with the officer seated on his left, finished, "Yes, let Raduma have him." He returned attention to the seven and pointed again. "You?"

"Ludovic Pye."

"Training?"

"Electronics engineer."

"Raduma," said Festerhead to the one on his left. "Next?"

"Henry Casasola. Engineer-armorer."

"Main workshops," decided Festerhead. "Next?"

"Robert Cheminais. Propulsion engineer."

"Main workshops. Next?"

"James Foley. Fleet doctor."

"Prison hospital," said Festerhead, promptly. "Next?"

"Frank Wardle. Pilot-commander."

"A pilot? We have no use whatever for alien pilots. How long is it since you were inducted into the Terran forces?"

"Eight years ago."

"And what were you before then?"

"A forestry expert," informed Wardle, forcing his face to keep straight.

Festerhead slapped a hand on the desk and exclaimed with a gratified air, "Superb! Put him in the jungle gang. We'll then have one of them who can turn round twice and still

know north from south." He stared inquiringly at the last Terran.

"William Holden. Navigator."

"What can we do with a navigator? Nothing! Have you no other technical qualification?"

"No."

"What were you originally?"

"A quarry manager."

Almost beaming, Festerhead said, "This one's for the stone gang."

Holden smirked back. He couldn't help it. Running through his mind was a brief speech made back on Terra by a gray-haired oldster.

"Without exception all intelligent lifeforms are builders. All large-scale builders employ natural resources, especially stone. One obtains stone from quarries. One quarries it by blasting. Therefore a quarry-worker has access to explosives which, nine times out of ten, are not under military protection." A pause while he waited for it to sink in, followed by, "You will now undergo a course on quarrying techniques with particular reference to explosives."

Not noticing Holden's expression, Festerhead returned attention to Wardle. "You were in charge of this Terran vessel that made a forced landing?"

"I was."

"Yet all of your crew were of the same rank, all captains. Why is that?"

"Each of us had risen to a captaincy in his own specialized profession."

"It seems strange to me," commented Festerhead. "The Terrans must have peculiar ways of doing things. However, it is of no consequence. I am concerned with something more important." He fixed a cold gaze on his listener. "This morning we received a signal from Kasta. They are taking all necessary measures to capture Snow White."

Wardle fought within himself to remain silent and impassive. It was an awful strain.

"Why was this female aboard?"

"We were transporting her to sector headquarters," lied Wardle, not daring to look at his six companions.

"Why?"

"I don't know. We had our orders and did not question them."

"Why is her name not recorded in the documents we have seized from your ship?"

"I don't know. The papers are prepared by Terran authorities. I cannot accept responsibility for what is or what is not written upon them."

"How did this female succeed in escaping while you seven were captured?" Festerhead persisted.

"She fled into the woods the moment we landed. We stayed by the ship, trying to repair it."

"Did she take anything with her? A weapon, or an instrument"—he bent forward, gave it emphasis—"such as a long-range transmitter?"

"I don't know. We were too busy to notice."

"Answer me truthfully or it will go hard with you! Is this Snow White an intelligence agent?"

"Not that I know of." Wardle made a deprecating gesture. "If she were, we wouldn't necessarily be told."

"Is she young or old?"

"Fairly young."

"And attractive?"

"Yes, I would call her that." Wardle felt a couple of beads of sweat sneaking down his spine.

Festerhead put on the knowing look of one who's been nicked by every night club and head waiter in town. "Have you any reason to suppose that she may have been the favorite of a high military commander?"

"Could be," conceded Wardle, radiating the admiration due from a yokel.

"And so, to us, a valuable hostage?" continued Festerhead, soaking up the worship of a hick.

"Could be," repeated Wardle, upping the output.

Preening himself, Festerhead said, "Describe her in full detail."

Wardle did it, right down to her stud earrings. It was a masterly picture worthy of Ananias at his best. Festerhead listened carefully while one of his officers wrote it down word for word.

"Have these details radiated to Kasta at once," ordered Festerhead when finally Wardle dried up. He switched attention to Slovits. "These Terrans will commence work today. See that they are taken where assigned."

Slovits led them away.

The seven were split up and conducted their various ways. They did not meet again until the Stame-line formed for the evening meal.

"No talking," greeted Wardle. "Leave it until later when we'll be alone."

Holden turned to Casasola, who was immediately behind him, empty bowl in hand. "You heard what the nice gentleman said. No talking. So keep your trap shut."

As usual, Casasola said nothing.

When they were in their room with the door fastened for the night, Wardle said, "Like me to start with the yap?"

"Might as well," agreed Pye, for the rest.

"All right. I've been with a gang of Stames cutting and hauling lumber. Six guards were with us, every one of them lazy and careless. They sat in a hut playing a kind of card game, knowing that nobody would take it on the lam because there's nowhere to go—not even home. Discipline gets pretty slack out there in the jungle."

"You want more of it?" asked Holden.

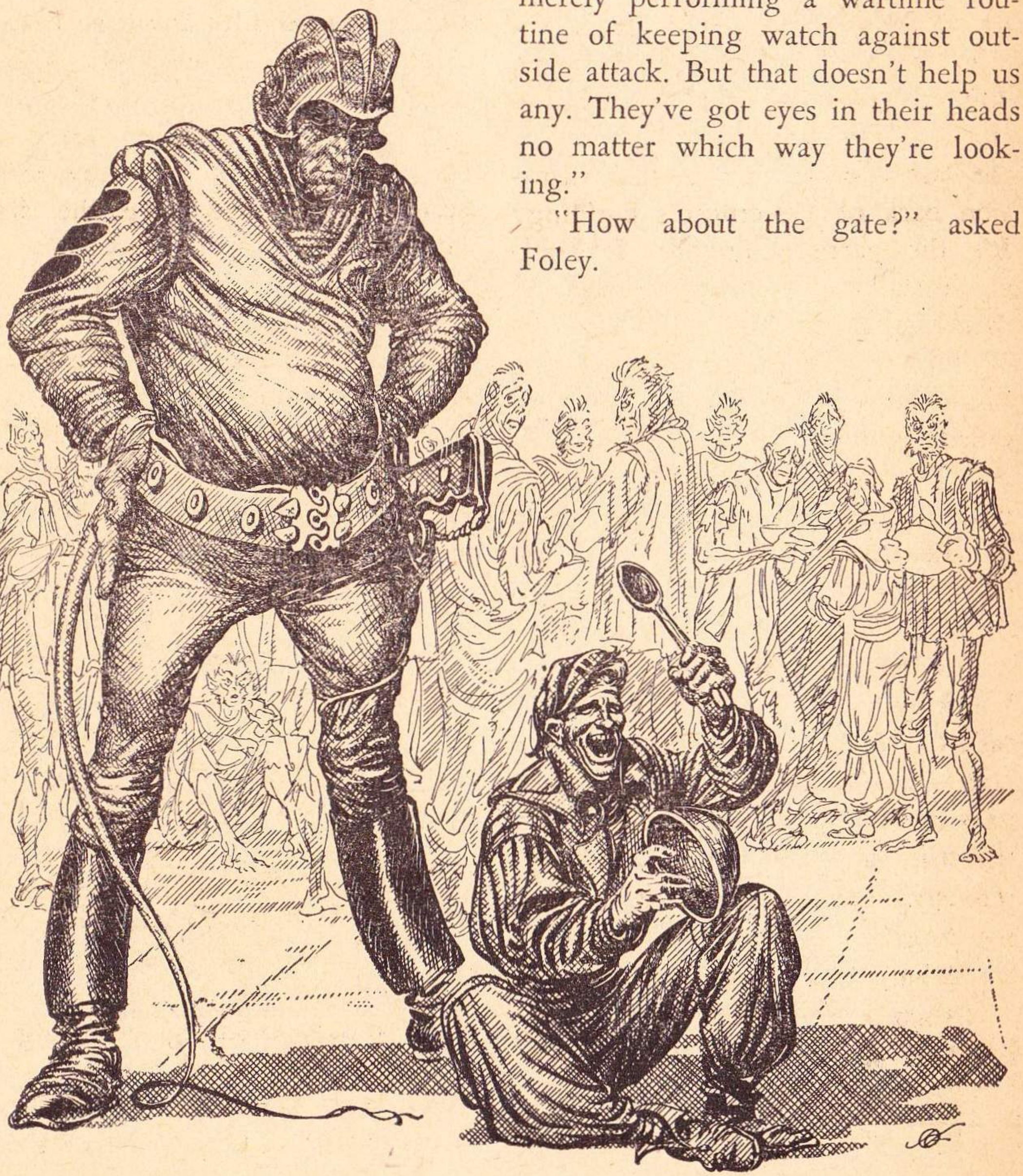
Ignoring the interruption, Wardle continued, "I talked plenty with those Stames and no guard ordered me to shut up. Seems that the Kastans have kept to their native time-keeping despite that the day here is more than twenty-eight hours

long. Their routine is based on the Kastan hour which measures just over forty-two of our minutes. All walls are patrolled four times per hour. Roughly, once every ten minutes."

"That's what we made it when we watched them last night," Pye reminded.

"So anyone who wants to get over that sixty-foot wall has got to do it in under ten minutes. If he's spotted he'll be shot on sight—not for trying to escape but for disobedience. Ten minutes isn't much of a margin." He shrugged, went on, "The wall-patrols haven't been established to prevent escapes because they don't expect any. They're merely performing a wartime routine of keeping watch against outside attack. But that doesn't help us any. They've got eyes in their heads no matter which way they're looking."

"How about the gate?" asked Foley.



"There's an all-night guard on it; twelve men and another twelve within call. There's a total of four hundred guards in this jail. There are forty similar prisons in Gathin. A dozen are within easy reach of here, some so near that their lumbering gangs are cutting timber alongside our mob."

"How near?"

"One of them is only a mile away. You could see it from the window but for the rise of land and the trees." Wardle paused, finished, "I've saved the best bit to the last. You've noticed that extension back of Festerhead's building? It's the garrison armory. It holds at least four hundred guns and plenty of ammo."

"Did any Stame get roused from his lethargy by your questions?" inquired Holden.

"Not that I noticed." Wardle pulled a face. "They attributed them to idle curiosity. How did you get on?"

Holden laughed with a rasping, knocking sound like that of a burial casket falling downstairs. Taking from his pocket a lump of soft, grayish substance, he tossed it into the air, caught it, juggled it dexterously. Then he molded it with his fingers.

"What's that?" asked Foley.

"Alamite."

"And what might alamite be?"

"Plastic explosive," said Holden.

"For heaven's sake!" Foley fell over a bed in his haste to make distance.

"Put it away," begged Pye. "You make me nervous."

"Bah!" said Holden. "You could bite it and chew it and nothing would happen. It needs a detonator."

"You wouldn't happen to have one with you?"

"No, I didn't bother to bring one. I can get fifty any time I want. And a ton of alamite to go with it. The stuff is touchy. The guards don't go near it. They leave the slaves to handle it and blow themselves apart." He gave the same laugh again. "I am a slave."

"How's that, fellows?" said Wardle, with great satisfaction. "One blast at the armory doors and we've got four hundred guns."

"I've something else, too." Putting the alamite back in a pocket, Holden removed his jacket and shirt, unwound from his middle a long coil of thin but strong cord. "It was lying around begging to be taken. Good, *houne?*"

"Hide it some place," urged Wardle. "We're going to need that rope before we're through." He turned to McAlpin. "What's your report?"

"They let Pye and me work together. In a big repair shop. All sorts of electronic stuff. The work is mostly radio and video servicing, the ordinary checking, adjusting or repairing of spaceship equipment. They kept close watch on the two of us until they became satisfied that

we really know our job. After that they left us alone to get on with it."

"Any chance of sabotaging their junk?"

"Not just yet," said McAlpin, regretfully. "Maybe later on. Raduma, who's in charge of the place, is a fussy character and to give him his due he's an expert. He likes everything perfect and regards a substandard job as a slur on his professional competence. Whenever we finish a piece of work he puts the equipment on the test-bench and checks its functioning personally. That doesn't leave us much scope, does it?"

"No, I guess not. But he's pernickety rather than suspicious?"

"That's right. And like all of his type he wastes no time or thought on apparatus which is beyond repair or not worth repairing. It gets tossed in the yard at back and is left there to rot."

"So—?"

"So we can help ourselves *ad lib* providing we do it surreptitiously and providing work goes on satisfactorily. There is a mountain of stuff from which we can take our pick—if nobody sees us picking. Some dexterous cannibalizing will get us everything we want. Our chief trouble is going to be that of smuggling it far from sight."

"Can you get it into the edge of the jungle?" asked Wardle.

"Sure thing. But no farther. We can't risk being missed more than five or six minutes at a time."

"Leave the rest to me. You get it into the jungle's fringe and let me know when and where. I'll have it dragged away somehow. I'm not in a timber gang for nothing. How long do you reckon it will take to swipe all the parts you need?"

McAlpin thought a bit. "We can make the booster in the workshop right under their noses. The bowl antenna will have to be sneaked piece by piece and assembled elsewhere. To make or steal the lot and get it away will take at least a fortnight—and that's assuming we're not caught."

"It won't be enough merely to make some equipment disappear," chipped in Pye. "We've also got to find a small clearing some place where we can set up the beacon without interference. It'll have to be off the forest tracks where no Kastan or gabby prisoner is likely to see it. It will also have to be within reach of power lines that we can tap."

"How near to power lines?"

"Say not more than eight hundred yards away," offered Pye. "I think we can grab enough cable to cover that distance."

"O. K. You tend to teleportating the stuff as far as the trees. I'll find a site and have it taken there."

"How?"

"Don't know yet. But it's my grief. I'll do it if it kills me." Wardle now turned attention to Foley. "Anything to say?"

"Not much. The prison hospital

is a blot on so-called civilization. Its chief concern is to get half-dead slaves back to work with the minimum of cost, trouble and delay. Even sick guards have a rough time of it there. The equipment is poor, the treatment inhuman, and Doctor-Major Machimbar, who bosses the place, is a disgrace to the medical profession."

"A warning, fellows," said Wardle, looking at the others. "Nobody falls sick if he can help it."

"Give you one guess at Machimbar's greeting when I reported to him," said Foley.

"Henceforth your sole purpose in life will be to please me," Holden suggested.

"Correct." Foley brooded a while, added, "There's two items of interest. For one, the hospital is outside the prison and within a short sprint of the jungle. Theoretically it's an easy escape route. In grim fact you've got to be *in extremis* to be taken there."

"And the other item?" Wardle prompted.

"I found a Stame colonel."

"You did?"

"I asked an emaciated Stame what he'd been before capture. He said a colonel of infantry. He and his troop had been paralyzed with gas and were in manacles when they recovered. They never had a chance but that doesn't stop him thinking himself a shame to his race."

"We can use him," said Wardle.

"We can do better," Foley replied. "According to him there are four more ex-colonels somewhere in this clink. There is also a former Aluesine major-general."

"Name?"

"General Partha-ak-Waym."

"We've got to find that character. We've got to get him into a corner and talk."

"And make him see reason," contributed Pye, openly doubting the ability of any foreigner to do so.

Holden said, "The night is young. There is one among us, name of Cheminais, specially trained to bust any lock yet devised by the thinking mind. Being able to count, I have estimated that there are four barrack-blocks in this emporium. Therefore there's one chance in four that our block holds this Pat Ak-Whatzit."

"Partha-ak-Waym," Foley corrected.

"That is what I said," declared Holden. "Well, what are we waiting for? You fellows crippled or something?"

"Can you open the door?" Wardle asked Cheminais.

That worthy, a burly and blue-jowled specimen, felt around his clothes, produced a festoon of lock-picks. "I have not spent a day in the main workshops for nothing." He started operating on the door.

"You were with him in the workshops," said Wardle to Casasola. "Did you get anything worth having?"

Without comment Casasola felt at the back of his neck, found a

loop of string, pulled it and hauled up what had been hanging down his back. It was the middle leaf of a Kastan truck-spring, a piece of steel thirty inches long, one inch wide, slightly curved. Two countersunk holes had been drilled either side of its center, also one hole at each end. He gave it to Wardle.

"Did you drill it yourself, without being spotted?" Wardle asked.

Casasola nodded.

"Good for you! Get any wire?"

Impassively Casasola handed over a coil of wire. Also a dozen six-inch nails with their heads cut off, their sheared ends slotted, their points ground needle sharp.

"Been quite a busy little bee, haven't you?" said Wardle, greatly pleased.

Casasola gave a faint smile and nodded again.

"The stupid, cockeyed thing!" swore Cheminais from the door. "Just because they're Kastans doesn't mean they've got to fix it upside-down." He did something to the lock. It squeaked in protest, surrendered with a click. The door swung open. "That's it. Dead easy once you've got the hang of it."

"Anyone coming with me?" Wardle glanced inquiringly around.

"Count me out," yawned Holden. "I'm too tired."

"I'll have to go," Cheminais pointed out. "There's a lock on every room."

"Maybe I should go, too," suggested Foley. "I've practically got an introduction from that Stame colonel. It may help to establish confidence at the start."

"Yes, you've made a point there." Wardle slipped cautiously into the corridor. It was empty. "Three of us are plenty. No sense in the lot of us trooping around. If a guard catches us, act dopey. The door didn't shut and we don't know we're doing wrong, see?" He thought a moment. "We'll start at the top floor and work down. That way we're less likely to walk into a beating-up."

Swiftly but quietly he moved along the corridor, reached the stairs. Despite lack of a lighting system within the building it was not difficult to see where one was going. Darkness was never absolute on Gathin, what with the shine of three moons and a multitude of stars. Moreover the flarepath along the wall-top contributed its share to interior illumination.

At the foot of the stairs Wardle paused, motioned the others to stay still while he listened. Not a sound came down from above, no stamp of patrolling boots, no creak of leather, not even a restless stirring of prisoners.

The thought raced through his mind that if those incarcerated in this block had all been Terrans the entire building would have resounded with the noises of energetic and mostly mutinous activity. The trouble with Terrans was that they were persistent practitioners of naughtiness. All the same, there were cir-

cumstances in which they had very considerable nuisance value.

He mounted the stairs, turned the end of another unguarded corridor, listened again, went up the next flight. Cheminais padded silently behind him. Foley followed in the rear, no more than a dark shadow.

At the top Wardle stopped. The others halted promptly, thinking he'd heard something. They listened but detected no cause for alarm.

"What's the matter?" whispered Foley.

"Just thought of something. Holden—he wouldn't come. It's not like him to refuse activity."

"He said he was tired."

"Yes, I know," Wardle murmured. "And he's a liar. I've just realized he had a conspiratorial expression when he said it. He wanted me out of the way. If he starts an uproar while we're up here—"

"Forget it," urged Foley. "We've got to take a chance. We can't go back now."

"Darn Holden!" swore Wardle in an undertone. "And his Snow White. He's the most undisciplined—"

"Aren't we all?" Foley gave him a gentle shove. "Move on. I want some sleep tonight even if you don't."

Wardle glided forward, scowling in the gloom. He found a door, put his ear to it, heard grunts and faint snores.

"Try this one."

Cheminais felt around the lock, fumbled with it until it clicked. The door emitted loud creaks as he shoved it open. Wardle went in. A Stame sat up hurriedly in bed, stared at him with incredulous eyes as big as an owl's.

"Any Aluesines in here?" asked Wardle, in low tones.

The Stame opened his mouth, shut it, opened it again. His eyes were straining to grow larger. He seemed stuck for words.

"Quick!—any Aluesines?"

"Two doors along." It came out in a gasp.

"Thanks." Wardle departed, carefully closing the door.

Behind him, the Stame crawled out of bed, shook awake the one in the next. "A Terran just came in. D'you hear me, Vermer? A Terran is wandering around contrary to orders."

"Then why should he come here?" said the other, with much disdain. "You have been dreaming." He rolled over and went back to sleep.

The second door swung inward without a sound. The three passed through, quiet as ghosts. Nevertheless they were heard and seen the moment they entered. These nocturnal Aluesines could never reconcile themselves to sleeping in their normally wakeful hours, they had sharp ears and superb nightsight.

All twenty were sitting up, their cat-eyes watching the door as the trio of Terrans came in.

In low tones Wardle said without preamble, "We are looking for

Partha-ak-Waym. Do any of you know where he is?"

One of them had enough self-possession to speak up promptly. "He is in this block, on the second floor, the middle room facing the yard."

Wardle eyed him with approval. "What is your rank?"

"A prisoner has no rank. Surely you know that?"

Foley chipped in with his own tactic. "What was your rank before capture?"

"I was a flight leader."

"Ah, a space-navy officer?"

"Yes—but there are no officers now."

"Your name?" asked Foley.

"Dareuth."

"Thanks! We shall remember it."

They made to depart but Dareuth was not prepared to leave it at that. "Earthmen, permit me to advise you —the latrines are best."

"Best?" Wardle paused in the doorway, looked back baffled. "Best for what?"

"For killing oneself. In any other place your comrades will be punished for allowing you to do it."

"Thank you, Dareuth," said Wardle, very courteously. He went into the corridor, closed the door. "God, what a state of mind! Anyone who breaks loose contrary to regulations is either looney or seeking a gibbet."

"Save your breath," Foley advised. "Do we try the second floor right now or do we leave it until another night?"

"We'll try now, while the going is good."

They got down to the second floor without mishap, found the right door. Cheminais unlocked it and they walked in. This room was a duplicate of their own, held twelve beds. A dozen Aluesines immediately sat up, wide awake and glowing-eyed.

Wardle whispered to the one on the nearest bed. The Aluesine pointed to the sixth and said, "There."

The three knew exactly what to do. They marched to the foot of the indicated bed, stood in line, shoulders squared, heads erect. Three arms flicked up in a precise salute.

"Captain Wardle and two officers reporting to General Partha-ak-Waym!"

General Partha retained full self-control and much dignity. Clambering out, he folded his one dirty blanket, pulled on his tattered and threadbare clothes. Then he gazed down upon the diminutive Terrans. He was older than the average prisoner, with many seams and wrinkles around the corners of his eyes.

"It does not help to be mocked," he said, quietly. "Former officers should know better than to behave in such a way."

"There is nothing 'former' about us, sir," replied Wardle, showing firmness. "We are still officers. I am still a captain. You are still a general."

"Really?" His features quirked. "A general in what army?"

By hokey, this was it! He'd asked for it and he was going to get it. Right where it would do the most good.

"I have the honor to inform you, sir, that you are a general of the Free Gath Republic."

"Indeed? Who says so?"

"The Space Union, sir. The Gaths need every officer they can muster."

"What nonsense is this?" said Partha, impatiently. "I have never heard of Gaths, never in my life. I do not believe that there is such a race. If there is, where are they located?"

"On Gathin, sir."

Hah, that hit him.

Partha rocked back. "But *this* is Gathin."

"That's correct, sir."

"I am not a native of Gathin."

"Neither are the Kastans."

"I am a . . . I am a—"

Wardle eyed him steadily. "You are a *what,* sir?"

There was no answer.

"Either you are a Gath or you are nothing," said Wardle. "And you cannot be nothing."

General Partha made no reply. He stood perfectly still as if on parade, his attention toward a window, his eyes upon the stars. Eleven other Aluesines got off their beds and stood with him, motivated by they knew not what.

"On this world of *ours,*" continued Wardle, "there is a horde of a quarter million Kastan invaders. There is also an army of four hundred thousand fighting Gaths who lack one thing and one only—guns."

"The Stames—"

"What Stames? There are no Stames here, sir. There are only Gaths."

It took Partha quite a time to cope with his churning thoughts. He had to win a mental battle against the fixed idea that a prisoner is of the damned, forever without hope of salvation, without escape other than in the grave. A topsy-turvy viewpoint is extremely hard to assimilate and, metaphorically speaking, these three Terrans had come at him walking on the ceiling.

But he was a general—and as such was helped to moral victory by swift realization of the military advantages of doing what comes unnaturally.

Studying Wardle with sudden shrewdness, he said, "A few questions. Firstly, what is the response you have obtained from the Gaths who resemble Stames?"

"None—for the reason that we haven't approached them yet. We had to start somewhere. We started with you, sir."

"You intend to put the matter to them?"

"Most certainly, sir."

"Secondly," continued Partha, "you have stated that we need guns. Can they be obtained and, if so, when?"

"Guns will become available when the Gath army has the guts to use them, sir."

He did not flinch. On the contrary, he became more dignified than ever. "I accept that without resentment. To regain honor we must earn it." He paused, went on, "Thirdly, my past training enables me to see the tactical benefits of the rise of a Gath army. I would like to know whether such a rise is a plan in itself or essential part of a greater scheme."

"It is part of a greater Union plan," said Wardle.

"Meaning that an established Gath Republic would find itself with allies?"

"Yes, sir. It would be officially recognized and supported by the Space Union."

"*All* the Union, including—?"

"Including the Aluesine Empire," Wardle assured. "Is there any reason why conquering Aluesines should not recognize triumphant Gaths?"

At that moment the stream of burning thoughts and the surge of violent emotions became too much for Partha. He sat on the edge of his bed, held his face in his hands. Terrans and Aluesines watched in awkward silence.

Finally he recovered and said, "Give me time to discuss these things with my comrades. Do you think you might be able to visit me again tomorrow night?"

"I cannot agree to do so, sir, unless you state it properly."

"Properly?"

"Yes, sir. You must stand to attention and say, 'Captain Wardle, I wish to consult my staff. Report to me at the same time tomorrow.'"

General Partha-ak-Waym came erect. Instinctively the Aluesines lined up on either side of him. There was a visible glow in his eyes, a firmness in his voice.

"Captain Wardle, I wish to consult my staff. Report to me at the same time tomorrow."

"Very well, sir." Wardle saluted. So did Cheminais and Foley. The three marched out.

Halfway up the stairs to the third floor, Foley said, "Hooked, by gosh!"

Halfway up the stairs to the fifth floor a shot split the silence of the night somewhere outside. The three bolted to their room like scared rats.

Wardle reacted with the speed of one who has hidden reasons to expect the worst. Leaving Cheminais to relock the door, he took one swift look around the room, booted a blanket-covered behind on the nearest bed.

"Where is he?"

Pye rolled over, struggled to raise himself on his elbows, bleared at the questioner. "Huh? 'Smatter?"

"Where's Holden?" Wardle bawled.

"Gone out," yawned Pye, dozily indifferent. He let the elbows slide from under him, sank back.

"Gone *where?*" cried Wardle, vastly irritated.

"That way." Pye pointed more or less toward an open window. Apparently this effort was too much for him because he let his arm drop, closed his eyes, gobbled and gulped a couple of times, settled down to a steady and rhythmic snore.

Wardle voiced five disconnected words none of which were in Extralingua. Crossing to the window he looked out and down. Sixty feet below the ground was vague, obscure, and he could detect nobody lurking there. A cord hung out the window, swaying slackly in the thin breeze of night. Within the room the cord was tied around the leg of a bed with about forty feet of surplus length coiled neatly alongside.

Even as he looked out a guard ran along the facing wall-top, disappeared from sight far over to the left. In that direction several voices could be heard arguing in the dark. What they were saying was indistinct, but they sounded querulous.

Returning to his own bed, Wardle flopped on it and stared fixedly at the window-gap. Foley and Cheminais washed at the one basin, lay down in the manner of men conspicuously unworried. Presently their snores were added to those of the others. Wardle continued to watch the window.

After half an hour the dangling cord went taut and emitted faint squeaks as it pressed hard on the woodwork of the window-frame. A head appeared in the gap, a body followed. Holden clambered through, pulled up the cord, carefully coiled it, closed the window. Then he spat on his hands and rubbed them against his pants.

"You cockeyed coot," said Wardle. "You'd try the patience of a sanctimony of bishops."

Holden started, recovered, said pleasantly, "You're looking well this evening—just had your tongue back from the cleaners?"

"This isn't funny. We heard a gun go off sometime back. It's going to endanger the whole set-up if we invite the Kastans to start shooting at us before we're ready."

"Nobody's been shooting at *me*, see?" said Holden.

"I suppose the gun exploded by sheer accident?"

"Dead right, chum. It was accidental but not quite sheer." Sitting on the edge of his bed, Holden started taking off his boots. "This joker had propped himself against the corner of the armory, being in need of more support than he gets from his sergeant. His gun was propped likewise. He'd worked it out very neatly that a weight on the ground isn't felt on the shoulder, see?"

"Yes, yes—get on with the story," urged Wardle.

"Well, I broke a piece of wire off the armory fence, bent each end to form a hook. It took me ten minutes to crawl to the corner. I hooked one end of the wire around his trigger, the other end to the

fence. Then I crawled back and left the rest to nature."

"You lunatic. If he'd seen you, he'd have put a stream of slugs through your belly then and there."

"He didn't see me. He wasn't seeing anything except Jennie with the light brown hair." Kicking his boots under the bed, Holden stood up. Undoing his pants, he felt around inside the seat, got a hold, commenced pulling out a long length of cloth. There seemed to be several yards of it.

Unable to suppress his curiosity, Wardle crossed to the other's bed, examined the stuff in the dim light. Then he grabbed it up, took it to the window for a better look.

"Holy cow! This is their flag!"

"Yair," agreed Holden.

"Where'd you get it?"

"I found it in the bullrushes." He let go a snicker. "What's good enough for Pharoah's daughter is good enough for me."

"The truth, man! You sneaked it right off the pole, didn't you?"

"Might as well admit it," said Holden, with mock resignation. "And a devil of a time I had getting it. Up on Festerhead's roof the wind is like a gale. I nearly fell off twice. If I'd held my jacket wide open I'd have become airborne."

"But . . . but—" Wardle waved the stolen banner and found himself temporarily lost for words.

"Four times a sentry passed below while I was struggling to get the thing down and stuff it in my pants. Never once did the stupid gump look upward."

"But—"

"We can use that rag. Cut off the crimson stripe at its end, convert the two white arrows into a six-pointed star, and what have you

got? One white star on a blue background. For whom has the Union designed that kind of flag?"

"The Gath Republic."

"Correct. You can be quite bright at times." Rolling onto his bed, Holden arranged his blanket to give maximum warmth.

"Where are we going to hide it until it's needed?" asked Wardle.

"That's your worry. I got it—you stash it. Anyway, they never do any systematic searching."

"There's always got to be a first time," Wardle pointed out. "I don't like this situation. Pandemonium will break loose when they discover their flag has been thieved overnight."

"They won't stir a hair. After I'd cut the cord I frayed the ends to look like a break. Ten to one they'll jump to the conclusion that the wind whisked it into the jungle. If they do, I'm going to volunteer to lead some of the forest gang in search of it. That'll give us a sweet excuse to go looking for a beacon site."

"You've got a hell of a nerve," said Wardle, with grudging admiration.

Holden made a gesture of modest rebuttal. "I'd rather not see myself as others see me—I'm conceited enough already."

With that, he went to sleep. But Wardle remained awake some time, nursing the flag and thinking. His final conclusion was that Holden could not be blamed.

After all, a Terran must do *something*.

Over the next four days the flag-hunters led by Holden failed to find so much as a loose thread. At the end of that time Festerhead's patience ran out. He put them back onto timber work, produced another banner from somewhere and had it nailed to the pole.

But efforts had not been wasted. In those four days they had discovered a suitable place amid the thickest tangle of growths, cleared a small area, dug a pit six feet square by four deep. This they filled with rocks then left in readiness for concreting-in the beacon legs at first opportunity.

It was on the twenty-first day of Terran captivity that a threat to carefully laid plans came from a completely unexpected quarter. It proved yet again that not everything can be foreseen even by the shrewdest, most painstaking minds.

Over every conglomeration of intelligent beings hangs an invisible something called atmosphere. It cannot be seen, tasted or smelled. It can be sensed. It can almost be felt.

After the evening meal on that day, Wardle stood in the yard and suddenly was struck by a powerful impression of change. A thrill of alarm ran through his mind as he sought to pin down and analyze the reasons. The atmosphere of the prison yard was different from what it had been three weeks ago; the cause or causes should be identifiable.

Now that his brain had become aware of the phenomenon it didn't take his eyes long to relate cause and effect. The usual mob of Stames and Aluesines were milling aimlessly around the yard. In the mass, they were still whipped dogs —individually they were not. A change had taken place in personal behavior.

They no longer slouched. They walked and some actually marched. They did not creep past guards with their heads lowered and their attention focused on the ground. On the contrary, they kept heads erect and stared straight at the guards, man to man, eye to eye. Even the persistently humorless, unsmiling Stames had switched expressions from glumness to grimness.

Over all lay that vague, indefinable but strong impression of a calm before a storm, a power held in check with no guarantee that it could bide its time.

The guards, too, sensed it without knowing what they sensed. Alien convention prevented them from recognizing the undercurrents and subtle stir-rumblings familiar to Terran wardens. So they were uneasy without knowing why. They fidgeted, kept guns in hands, grouped together in the yard, walked at faster pace along the wall-tops.

With back hairs rising, Wardle set off on a hurried tour of the yard. In such a crowd it was difficult to find at once the individual he was seeking. Near one corner he encountered Pye.

"Help find Partha for me. Also grab any Stame brasshats you happen to see."

"Something wrong?" asked Pye.

"Take a look around. This lot's making ready to go bang any time. It's the old story of the pendulum swinging to the other extreme." He jerked a thumb toward a small cluster of guards standing together in the shadow of the wall. "Even the Kastans are jumpy. When that type goes round the bend they're liable to start shooting at whoever happens to be handy. And that means *us.*"

Partha and two Stame colonels were found a few minutes later and shepherded into an unoccupied corner of the yard. There, Wardle made them a brief speech pointing out the giveaway symptoms, contrasting the controllability of an army with the indiscipline of a mob.

"Previously your men waited with complete despair," he said. "Now they wait with renewed hope that comes harder. It is trying to the patience."

"You created the disease," commented Partha. "It is for you to suggest a cure."

"All right. Pass the word around as fast as your words can go that we're holding a conference tonight and that we'll be wanting volunteers tomorrow."

"Volunteers for what?"

"I don't know, I just don't know," admitted Wardle, momentarily at his wit's end. "We'll have to concoct a scheme of some sort,

any sort so long as it pipes off the mounting steam. It's the philosophy of the trapped rat—when nothing can be done, do *anything.*"

"Very well," agreed Partha. He made to go.

"And tell everyone it's essential not to let the Kastans take alarm," Wardle added, with much emphasis. "That means all prisoners must look like slaves, behave like slaves."

Partha and the Stames went off, mixed in with the crowd, talked briefly to various groups and moved on. Within twenty minutes results became visible but Wardle did not feel happy about them.

Like all amateurs, the captives tended to overact. Many of those who'd been walking erect and secretly incubating a lovely spirit of defiance now put on grossly exaggerated expressions of humility and made a point of exhibiting them to baffled guards. Twenty Stames ceremoniously sat down in front of three Kastans and favored them with a unanimous look of oh-death-where-is-thy-sting.

Holden ambled up and Wardle greeted him bitterly with, "Look at that mob of raw beginners. They were feeling their oats and have been told to relax. Now you'd think the entire bunch was sickening for something."

"That's an idea," said Holden.

"Eh?"

"The Kastan war economy is partly dependent on slave labor. An epidemic would make a nice, effective form of sabotage, not to mention the hob it would play with their organization here."

"An epidemic of what?"

"Soap," said Holden.

"How about talking sense, just for a pleasant change?" Wardle suggested.

Ignoring that, Holden exclaimed, "Here's Foley." He waited until the other arrived, went on, "Just the man we want. What's the capacity of the hospital?"

"Thirty," said Foley. "Why?"

"What do you think this butcher Machimbar would do if three hundred prisoners flopped together?"

"Nothing. Not a thing. He'd let 'em die. He'd say the hospital is full and that Kastan guards have first call on his services. Machimbar is the sort who does only the minimum necessary to justify his rank and position and, if possible, prevent himself from being drafted to a combat area."

"A shirker of responsibility, is he?"

"More than that—he's a thoroughly selfish swine."

"He'll get his," promised Holden, "before we're through."

"What's on your mind—other than water?" asked Wardle.

A whistle shrilled across the yard before the other could reply. Prisoners assembled in long lines and started filing into their barrack-blocks. Guards prowled along the lines, bawling and blustering, urging them to hurry.

There was one small but signifi-

cant incident. A lame Stame stumbled and fell out the shuffling ranks. Swearing at him, a guard raised his whip. The Stame straightened, gazed coldly into the eyes of his enemy until the other gave way and the whip drooped unused.

"We haven't a lot of time," commented Wardle. "Let's hope we've got enough or can make enough."

Cheminais put in some fast manipulating that night. He tended to three doors in his own block, two in the adjoining one. A dozen prisoners made the twenty-yard dash between blocks in semidarkness, got across unheard, unseen. A council of war was held in the Terran's room.

"We've several problems," began Wardle. "They've got to be settled in any way solvable within existing circumstances. First, there's the beacon."

"Has it been discovered?" asked Partha-ak-Waym.

"Not so far. We've built it, linked it to a power line and that's all. If the Kastans happen to find it, there's a good chance they'll assume it to be the work of one of their own signal corps. Even if they do get incurably curious it may take them a couple of months to make sure that no Kastan outfit knows anything about it."

"Not sharing our outlook," put in Holden, "they won't take it for granted that it's a product of naughty prisoners."

"Well, what's the problem?" Partha persisted.

"The forest gang did hard but unskilled work. They sneaked away all the stuff that McAlpin and Pye hid among the trees, erected it according to their instructions. Now it needs technicians to make final adjustments and start it radiating. Daytimes McAlpin and Pye can't slip away for more than five minutes at a go. They say they've got to have three or four uninterrupted hours to get the beacon functioning." He paused, added pointedly, "Union forces don't know the location of Gathin—until the beacon tells 'em."

"I can find some technicians among my men," suggested Partha. "If you can get them into the forest gang—"

"This is our own problem and we're going to cope with it in our own way," declared Wardle. "We'll give McAlpin and Pye a night out. They'll go over the wall."

"You mean—*escape?*" Partha voiced the word as though even now it had a slight touch of blasphemy.

"Not for keeps. They'll come back and report for work in the morning as usual. As I said before, we've got to keep the Kastans soothed. However, it might give all prisoners a boost if you let the news go round that we've been outside. Better warn them, though, not to mess things up by behaving as if they're as good as out themselves. They aren't out—yet."

"But to get over that wall is impossible."

"We'll admit it after we've found it can't be done," said Wardle. "And not before." Dismissing the point, he carried on to the second problem. "About ten thousand are in this jail but four hundred thousand on Gathin. We've a mere tithe of the whole. We've got to contact other prisons, persuade them to join in with us and take action at the same time. There are seven within easy reach. If they're the same size as this one, that means another seventy thousand men available."

Partha pursed his lips and frowned. "There is no communication between prisons."

"Then communication must be established. It's got to be done and will be done—and here's how." Wardle registered a faint smile as he continued, "You may not realize it, but to Terran eyes most Aluesines look remarkably alike. So also do Stames."

"Terrans look much alike to us," said Partha.

"It's highly probable that Kastans have similar trouble in distinguishing one from another," Wardle pointed out. "Adjacent prisons have forestry parties working almost alongside ours. If some prisoners swapped places, their respective guards wouldn't notice the difference."

"If they did notice, they wouldn't care," suggested Holden. "One bunch of slaves is as good as another."

"Maybe," Wardle conceded. "But a scheme can always be wrecked by one individual's officiousness." He returned attention to Partha. "You must find a number of volunteers, all officers capable of restoring and exercising their own authority, all able propagandists for the new viewpoint. They will join a forestry gang and switch into one from another prison."

"That can be done," agreed Partha. "There is one difficulty. An exchange is a two-way arrangement. It needs the co-operation of others who mentally are still slaves conditioned never to disobey."

"The Kastans haven't issued any orders about captives returning to their own jail. You can't disobey a command that has never been given. Besides, to change prisons is not to escape."

"Yes, that is true. Leave this task to me."

"We'll have to. We've no choice. A Terran can't swap. Among a bunch of eight-footers he'd be as conspicuous as a circus midget." Leaving it at that, Wardle said, "Now to our third problem. Prisoners must hold themselves in restraint until arrives the right moment to strike together and effectively. Premature action by individuals or groups could be fatal to our plans. We've got to insure that they don't jump the gun. Any suggestions?"

"They need a diversion," opined

Holden. "One good hullabaloo would keep them happy for a month."

"Can you offer a suitable gag?"

"Yair," said Holden. He chewed vigorously, let go with a soul-shaking, "A-a-argh!" and fell flat. Then he curled up violently until his knees rammed into his chest, his eyes rolled under the lids to show only the whites, a long spurt of foam came from his writhing lips. It was a sight sufficiently revolting to turn the onlookers' stomachs.

"A-a-argh!" groaned Holden, most horribly. More foam appeared. Watching Stames and Aluesines bugged their eyes at him. Even Wardle felt a spasm of alarm.

Making a remarkable recovery, Holden got up, went to the basin, washed his mouth out, gargled a couple of times. "All it needs is a little practice."

"What good will it do?" inquired Partha, studying him as one would a maniac.

"A sick slave cannot work. A hundred sick slaves cannot work. A thousand sick—"

"Show me how," ordered Partha, making up his mind.

Shaving off a sliver of soap, Holden put it in the other's mouth, doing it like mailing a letter. "Now chew. All right, fall down. Curl up and moan. Louder than that, much louder. Your eyes, man, your eyes —roll them up until you can look at your brains!"

General Partha-ak-Waym lay curled up and rolled 'em. It was extremely effective since Aluesine eyeballs were pale orange in color. He looked awful.

Within short time ten Aluesines and eight Stames were groaning and foaming on the floor. It was, thought Wardle privately, the most beautiful chore ever thought up for a bunch of military brasshats.

"Good," he said when the horrid performance ended. "Find a battalion of volunteers for that and get them busy rehearsing. The show goes on at breakfast-time tomorrow. It should provide a satisfactory emotional outlet and bollix the Kastans more than somewhat."

The council of war ended. The members departed accompanied by Cheminais who was to lock them back in.

When they'd all gone, Wardle turned to Holden. "You said it needed practice. You've had plenty. Where'd you get it?"

"At about age four. Whenever I rolled and foamed my loving mother would give me the moon."

"What a repulsive little brat you must have been. If I were your father, I'd have given you a taste of hickory."

"He did," admitted Holden, grimacing. "Whenever he caught me at it." He switched attention to the silently listening Casasola. "For Pete's sake shut up and let me get a word in edgewise."

"We're wasting time," commented Wardle, impatiently. "The longest night doesn't last forever. We've got to get two fellows over

the wall—we've not erected a secret beacon for nothing."

Lying on his back he edged beneath his bed, fiddled around with the underside of it, edged out again. He was now gripping a grooved wooden stock with the truck-spring fastened across one end. A wire ran taut across the spring's curve. Farther back in the stock was a winder and a simple trigger mechanism which Casasola had made in the workshops.

"This," he remarked, "is where we put to use our training in the exploitation of rudimentary supplies. Learn to make the best of what is available, they said. And do not despise primitive things, for man conquered the animal world with no better." He held a hand out to Casasola. "The bolts."

Casasola gave him the machined nails which by now had small aluminum vanes fitted into their slots.

"The string."

Impassively Casasola handed over a ball of fine twine. Measuring it along the room, Wardle cut off a length of approximately a hundred and twenty feet, doubled it, fastened its middle to the tail of a bolt. Six inches behind the bolt he knotted-in a sliver of wood to act as a spreader, holding the strings some three or four inches apart.

"Open a window, someone, and watch for a guard." He stood waiting while Pye tied one of the string's two ends to the coil of stronger cord that Holden had stolen from the quarry. "Remember," he said to Pye, "when everything is ready you'll have less than ten minutes."

"I know."

"Too much delay will get you a dozen slugs in the guts."

"So what?"

"If you or Mac want to back out, say so—we'll understand."

"Go jump," suggested Pye.

"What d'you think I am?" put in McAlpin, indignantly.

"Guard coming," hissed Holden from the window. "Here he is, the big, flatfooted lug. Right opposite." A pause, followed by, "Now he's passed."

He stepped aside. Wardle knelt by the window and steadied the crossbow on its ledge. Taking careful aim at the distant wall-top, he squeezed the trigger. The arbelest gave a slight jerk as its driving-wire slapped dully against two small silencers neatly carved from Holden's rubber heels.

The bolt shot into the night, fled three-quarters of the way to the wall, pulled up sharp as its trailing string snagged on a window-frame splinter and failed to pay out. In the darkness the bolt swooped back, hit the barrack-block two floors lower down. There sounded a loud clunk, a clatter of broken glass, a startled Stame exclamation.

Wardle cussed in a low voice, peered out and down for signs of Stame activity beneath. There wasn't any. Whoever had been shaken out of his beauty sleep had wisely de-

cided to do nothing about it, probably because nothing effective could be done.

"A minute and a half gone," announced Pye.

They pulled back the tethered bolt, shaved the splinter from the ledge, rearranged the string to run more freely. Again Wardle took aim a few inches above the flarepath. The bolt sped out, went straight over the wall, stopped as it reached the following string's limit.

Slowly and with care they drew on the string. Infuriatingly, the bolt wriggled between the spikes and fell clear. Now they reeled in with frantic haste but again it clunked the barrack-block with a sound hugely magnified by the stillness of night. However, no glass was busted this time.

"Four minutes gone," said Pye.

The third shot proved just as futile, produced yet another crack of metal against stone. When the bolt came in they found the string-separator had broken. Hurriedly they replaced it.

"Six and a half minutes," informed Pye, morbidly.

"He's on his way back by now," said Wardle. "We'd better wait for him to pass again."

Clustering in the gloom, they listened and waited, hearing little save each other's breathing. Presently the guard went by along the wall-top, his big figure magnified to the monstrous by the flare of light. He did not look unusually alert, showed no sign of having been alarmed by strange noises.

When he'd gone from view, Wardle fired again. The bolt shot out with a very faint hiss. Its aluminum vanes shone briefly as it crossed the wall-top. Holden gently drew on the string and a few feet came into the room before it went taut.

"Hallelujah!" he said.

He now pulled only one end, giving a couple of fierce jerks to dislodge the distant separator. It stuck stubbornly a short time, came free. The string then reeled in easily. As it did so its other end went out the window taking with it the strong cord.

Before long Holden found himself pulling in cord instead of string. There was now a double line of cord extending from the room, across a forty-foot gap with a sixty-foot drop below, and terminating at one or more wall-top spikes over which it was looped.

"How long have we now?" asked Wardle.

"Four minutes."

"Not enough. We'll have to wait again. Got your own cord ready?"

"Sure thing," said Pye.

They waited. The guard's footsteps could be heard coming back. He seemed to take an inordinate time to get near. Everything depended on where his attention lay, how observant he was. The flarepath was a brilliant but narrow beam directed dead along the wall-top but there was enough side-glow to re-

veal the horizontally stretched string for a distance of several feet.

The guard neared the critical point. They held their breaths as they watched him. Strolling boredly along, he halted beside the looped spike, looked outward instead of inward, gave a wide yawn and moved onward.

"Thank heaven we blacked that rope," exclaimed Holden.

"Now!" urged Wardle.

Pye scrambled out the window, let himself hang from the cords by holding one in each grip. With body dangling over the drop he worked himself along hand over hand. His legs swung wildly as he strove to make speed. The cord creaked but held.

In this manner he reached the wall-top and still had come no raucous shout, no crack of a gun. Desperately he swung himself up sidewise, got handholds on two spikes, a toehold between two more. Levering himself over the triple row he rolled right into the flarepath.

Still prone, fearful of the light and whoever might look along its beam, he grabbed his own coil of rope, looped it around one of the opposite spikes. How he got over this other triple row was not clear to the watchers. His body humped itself, there was some momentary fumbling, he vanished from sight as he slid down outside the wall.

"It took him four and a half minutes," said Holden.

"Seemed like ten years to me," contributed Wardle.

The guard mooched back. There were now two looped spikes for him to discover, one on each side of his path. Would he see them? He did not. In the same manner as before he ambled by and his footsteps faded.

McAlpin was swinging in midair almost before the guard had disappeared. He crossed the gap a good deal faster than Pye had done but had more difficulty in getting over the spikes. All the same, he made it. His shape vanished over the other side of the wall.

Unfastening one end of the cord, Holden pulled on the other end, got it all back into the room. To leave it out for several hours would be to tempt Providence. Perforce the outer rope would have to remain dangling, but only the couple of inches around the spike could be visible to the guard, the rest hanging in darkness down the wall.

"Just thought of something," said Holden. "A fellow parading along a flarepath can see pretty well to the right or left but is somewhat blinded if he looks straight ahead. I doubt whether that clunker could find Pye's rope even if you told him it was there."

"We're not counting on that," Wardle told him. "We are betting on a state of mind. Excepting on a peculiar dump called Terra nobody ever breaks out of jail—but nobody!"

After that they organized a constant watch at the window, taking turns one at a time while the others slept. It was an hour before dawn when the escapees returned.

Cheminais, keeping red-rimmed eyes directed on the wall, knew that their rope was still in position because every guard had been observed and none had so far interferred.

A guard went past, gun clasped in a spade-sized hand. A minute later McAlpin heaved himself over the outer spikes, pulled up half of the doubled cord and slung it down the inside wall. Then he rolled across the flarepath, got over the next lot of spikes with the same difficulty as before, slid down into darkness.

Apparently his thirty pounds of extra weight helped heave his companion up the outer wall as he went down the inner one. He'd no sooner gone than Pye popped up like a cork from a bottle, looped the cord and followed the other down inside. The cord shook violently, fell to ground.

Awakening the others, Cheminais informed, "They're back."

They let the guard pass again before tossing their own cord out the window. A weight came upon it, they hauled together. McAlpin rose into the window-gap, struggled through, trod on someone's toes and received a couple of choice oaths by way of welcome. The cord went down again, fished up Pye.

"How did it go?" Wardle asked them, anxiously.

"Topnotch," assured McAlpin. "The beacon is now bawling its head off."

"What d'you think will happen if it's picked up by a Kastan ship ahead of one of ours?"

"They'll trace it to Gathin. They know Gathin is a Kastan stronghold. Therefore the beacon must be an official one even if they haven't been notified of it. That's logical, isn't it? The alternative is an illegal beacon and that's plain silly."

"Let's hope you're right. You've done a good job."

"Like to know the toughest part of it?" McAlpin showed him a pair of red-seared palms. "Climbing sixty feet of thin cord."

"Dead easy," scoffed Holden.

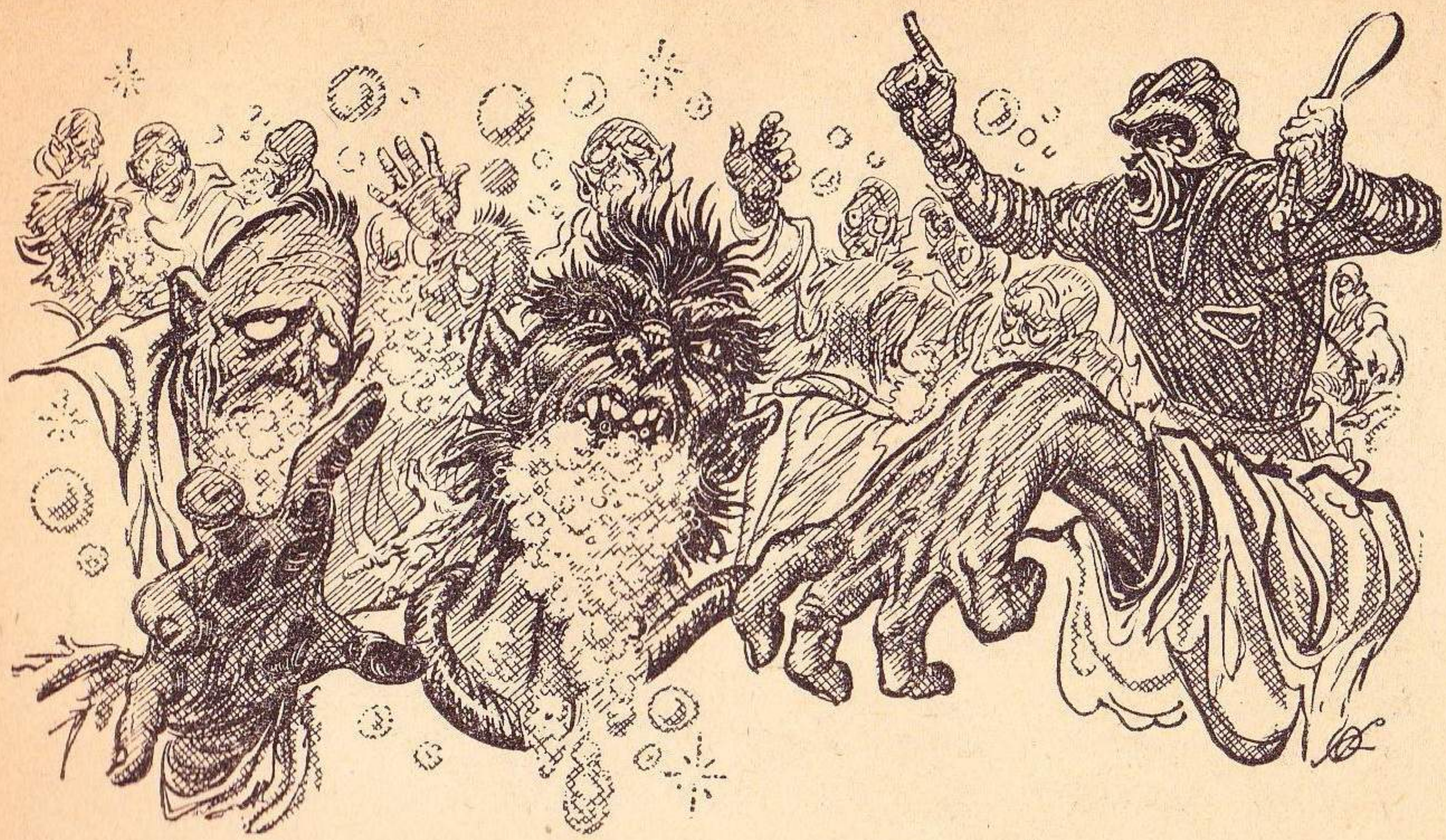
"It would be for you," McAlpin retorted, "being several generations nearer to the monkeys."

Holden let that pass with the contempt it deserved.

"Well," prompted Casasola, shocking him with sudden speech, "why don't you *say* something?"

The multiple line-ups for breakfast were divisible into two parts: those aware and those unaware of what was brewing. Partha had considered it desirable to keep a goodly number in ignorance and thus support the play with an audience that could be depended upon to behave plausibly.

Stewed sludge was served. Ten thousand sat around scooping at their wooden bowls. The last and



slowest had hardly finished when Guard-Major Slovits blew the whistle.

Eighty prisoners judiciously scattered around the yard promptly collapsed, doubled up, foamed, yelled bloody murder. The mob about to make for the gates stopped and stared. Near the gates four hefty guards gazed aghast at an afflicted Stame who was making like a circus acrobat with a thousand devils in his belly.

Among the guards there followed the inevitable moment of chronic indecision during which another fifty prisoners artistically added themselves to the sufferers on the floor. They vied with each other in producing the most foam, the loudest screams, the worst agonies.

Prisoners not in the plot milled around like scared sheep, watched themselves for similar symptoms. A number of guards became pinned within the mob, strove to force their way out. Stames and Aluesines dropped and had six fits in front of them, alongside of them, impeding them to the utmost. The mob pushed and shoved as those nearest tried to back away from each successive victim.

One Stame standing in what looked like shocked silence suddenly let go with an ear-splitting shriek, flung long, skinny arms around an adjacent guard, slid down foaming and slobbering all over the Kastan's pants and jackboots. He got away with it, receiving not so much as a flick of the whip. The guard looked down in horror, made for some place else good and fast.

Slovits pounded heavily into the office building, reappeared a moment later with the prison com-

mander. A solid rank of sixteen Aluesines immediately strove to please both of them by falling flat, foaming, groaning, dribbling and rolling orange-colored eyeballs.

Noting that Festerhead himself was now among those present another couple of hundred piled into the act all over the yard, added their howls to the general uproar. Guards shouted unhearable orders, Festerhead bellowed and waved his arms, Slovits blew the whistle ten times.

More individuals collapsed here and there in response to surreptitious signals from officers. Some of them were decided whole-hoggers who worked themselves into such a frenzy they swallowed their soap and began to puke in dead earnest.

At this point the captives who were uninformed got into a panic. The rumor went around like wildfire that something called "the black death" was highly contagious. There followed a concerted rush for the open gates.

Four guards who still had their wits about them moved swiftly, slammed shut the gates in the faces of the leading rank. The mob churned around a piece, made up its collective mind, headed for the sanctuary of the barrack-blocks. It split into a hundred racing lines threading their ways through a carpet of rolling bodies. Among the runners were many more plotters ordered to hold off until the last. These now made confusion worse confounded by collapsing in the most obstructive places including the barrack-blocks' doorways.

By now over a thousand were on their backs in the yard, screaming, hooting, hugging their bellies, voicing death rattles and other versions of last gasps. A form of rivalry had arisen between Aluesines and Stames, each striving to outdo the other in putting over a melodramatic picture of hell's torments. The resulting scene was like something out of the galaxy's maddest madhouse. The din was deafening.

Festerhead and his forces were swamped by the sheer magnitude and enthusiasm of this mass-display. Grouping together outside the office building, they scowled at the littered yard but did nothing. This wasn't mutiny, it wasn't disobedience. It was a phenomenon unheard-of, unthought-of. No mention of it existed in the Kastan book of rules and there was no official formula for coping with it.

A Stame who secretly admired his own talent as an actor crawled laboriously on all fours up to Guard-Major Slovits, hung out a purple tongue and croaked, "Water! For mercy's sake, water."

The guard next to Slovits swung a huge boot and kicked him straight in the teeth. The Stame flopped sidewise, spat blood and emitted moans that were real. Among the prone army of mock-sufferers several hundreds of eyes made vengeful note of the kicker's identity. Unaware of this, the guard

drew back his foot for a second belt at the victim.

"What are you doing, fool?" rasped Festerhead. "Is that the way to make them ready for work?"

Putting down the foot, the guard furtively shifted behind a couple of his fellows. From that vantage point he stared sullenly at the injured Stame.

"Where is Doctor-Major Machimbar?" Festerhead demanded of Slovits.

"He is absent today, may it please you, commander," informed Slovits.

"He would be. And it does not please me." Festerhead thought hard and fast. "Something must be done. Within the hour headquarters will be pestering us with awkward questions as to why our working parties have not appeared."

"Yes, commander. What do you suggest?"

"Send twelve men into each barrack-block. They will march out all the fit prisoners and make them carry the sick ones inside. After that has been done, parade the fit ones in the yard, select from them any with medical experience, rush the rest to work—at the double."

"As you order, commander."

Slovits saluted, faced his men, favored them with the necessary bellowing. Parties of twelve split off and headed for each block.

The fit came out, picked up the sick, commenced bearing them to their respective dormitories. It took quite a time because every now and then a body-bearer would collapse and have to be carried in his turn. Thus it happened that the entire complement of one room, consisting of twenty opportunist Aluesines, contrived to have themselves borne to bed by a bunch of sour-faced Stames who did not see the obvious way of dodging the chore until it was too late.

Finally the fit were paraded in the yard, the fit being defined as those able to stand. Two dozen of them dropped in their tracks just as Slovits opened his mouth to bawl. Slovits closed the mouth while the end files wearily picked up the bodies and lugged them away. Five of the luggers swiftly decided that it requires less effort to be carried than to carry, whereupon they flopped and put on the foaming act. More end files broke off to take those away.

At that point Slovits came to the end of his patience. Stabbing a large finger at those still perpendicular, he roared, "All former doctors, surgeons, hospital orderlies and similar personnel will take six paces to the front."

Foley marched forward bawling with equal loudness, "One, two, three, four, five, *six.*" He halted.

Eight Aluesines and eleven Stames did likewise, yelling in unison and finishing with a simultaneous, "*Six.*" As if that were a signal, two of them bit the dust.

Slovits glared a moment at the two, his face twitching, his fingers working around. Then he said to the survivors, "Follow me."

Obediently they traipsed behind him to the office building. Three who preferred bed to Festerhead shamelessly gained their ends by collapsing on the way. Four more did the same during the ten minutes' wait outside the open door through which Festerhead could be heard shouting indistinguishable remarks into a telephone.

At the prison gates the situation was no better. Long files of captives shuffled outward, bowls and spoons clutched in boney hands, worn boots flapping or bare feet padding on the concrete. Every fifty yards or so the files halted, doubled-up bodies were dragged out the way and borne back to the blocks. Then another fifty yards advance, a halt, more bodies.

For once the escorting Kastans did not yell, swear or swing their whips. They marched with the column, urging it onward but viewing its gradual loss of numbers with cold-blooded indifference. So far as they were concerned an epidemic was a calamity strictly for the brasshats. Let them do the worrying. That's what they were paid for, wasn't it?

Festerhead slammed down the phone, came out the door, cast a savage eye over the waiting eleven and harshed, "You will remain in the blocks and tend to the sick. I hold you responsible for restoring them to work with the minimum of delay. If you fail, you will be punished." He let his glare linger a moment upon each in turn. "The punishment will be severe."

"If we do fail," answered Foley, calmly positive, "the consequences will be more severe—the entire prison will be down and out, Kastans included."

"It is for you to prevent it."

"With what?" demanded Foley, greatly daring. "We have no medical kit, no supplies of any sort."

"I authorize you to make use of whatever facilities are in the hospital," Festerhead snapped.

"What if Doctor-Major Machimbar refuses us those facilities?"

"He will do nothing of the kind," declared Festerhead. "I am the prison commander. My orders will be obeyed. You will employ whatever supplies are available within the hospital and get the prisoners back to work." He turned to go, added as a pointed afterthought, "Or you will suffer."

One of the listening Stames started suffering then and there, flat on his back, with his feet trying to tuck themselves behind his ears.

Holden paced up and down the room, glanced through the windows at the starlit night and mused aloud. "It was a spectacular show but very much overdone. A Terran guard wouldn't have been fooled. They'd have had the high-pressure hoses out in one minute flat."

"How come you're such an authority on Terran prison techniques?" asked Alpin McAlpin.

"I know what I know."

"Sure thing you do. Bet your past is buried in the mists of iniquity."

"Quit needling," ordered Wardle, with some impatience. "Here's Partha and his boys. Let's get down to business."

Cheminais entered first, the lockpicks jangling carelessly in one hand. Then Partha followed by twenty Stames and Aluesines. The Terrans made sitting-space for them on the beds. Outside, a guard mooched along the flarepath and was blissfully ignorant of conspiratorial activity almost within hearing distance.

Wardle started the discussion with, "As probably you know, twenty-one managed to exchange with adjacent forest-parties today. Some of them will have to swap over a second or third time to spread themselves evenly around the local jails." He fixed attention on Partha. "The number isn't enough. Twice as many are needed. Can you raise more volunteers?"

"After today's performance," said Partha, permitting himself the ghost of a smile, "I don't think volunteers will be hard to find."

"According to what we've learned," Wardle went on, "there are twelve prisons within one day's march of here. Seven of these are almost within sight. We are getting some of our own men into those seven. We'd better send more, just in case they can find a way of wangling themselves into the other five."

"It's worth a try," Partha agreed. "An army of one hundred and twenty thousand is better than one of seventy thousand. I have heard that there are forty prisons on Gathin, also several new ones not yet completed but possibly holding recently captured men. How nice if we could extend our influence over the whole lot."

"I've thought of that. The others are far away, some halfway around the planet. We could get at them by desperate and tedious measures, that's for sure. But it would take too long and the trouble isn't worth it. If we can make a major break in this area, and snatch enough guns, we can seize all the other prisons, one at a time, by main force."

Partha thought it over, objected, "The sole object of capturing prisons is to free the prisoners and thereby pile up the strength of the Gath Army. That's correct, isn't it?"

"Yes," said Wardle.

"There will be a formidable difference between prisoners conditioned by freedom propaganda and those who've never heard of it, never imagined it. Here we're building a mass of potential warriors filled with new hope and eager to fight. Elsewhere, a prison will give up no more than a mob of bewildered slaves."

"How long d'you think it will take a bewildered slave to see his chance to bust a Kastan right on the nose?" inquired Wardle.

"I can judge only by myself,"

Partha confessed, "and in my case it took too long."

"That's because you're a general. You're trained to be militarily correct, to look at everything from the viewpoint of personal responsibility. The lower ranks have no such inhibitions. Put guns in their hands, tell them that they are Gaths, that honor may be regained by kicking Kastans in the guts and"—he made an emphatic gesture—"I give them two minutes to absorb the facts and start shooting."

"I hope you're right," said Partha, doubtfully.

"Wait and see. Who put over the most extravagant displays this morning? The boys in the ranks. It wasn't an officer who sicked all over a guard's shiny boots."

Partha looked pained.

"Anyway, let's leave it at that. The real test will come before long. Right now we've something important to be settled." Standing in front of Partha, and speaking with great seriousness, Wardle said, "When the proper time arrives there will be two ways of obtaining guns."

"Two?"

"Yes. And it's for you to decide which way is preferred."

"Why me?"

"Because at the moment you are the only serving general in the forces of the Gath Republic. Therefore you are in command of those forces *and* the spokesman for that republic."

"I see. What is my choice?"

"Terran task forces will drop guns and other war supplies into prisons ready to receive and use them. They will also drop paratroops and special combat teams to take nearby barracks, armories and strongpoints." He paused to let that sink in, added, "Alternatively, the Gath Republic will fight its own battles and win its own victory with arms seized from its enemies."

Getting to his feet, Partha held himself erect, hands at sides, and said quietly, "The fight will be harder, the losses more grievous—but we prefer to face the struggle on our own." Behind him the listening Stames and Aluesines gave a murmur of agreement.

"Back on Earth," commented Wardle, smiling, "the betting was forty to one that you'd make that decision. The entire Gath Republic idea was based on the supposition that every intelligent being has his pride, that he measures it by his own ability to restore it and maintain it. That goes even for a prisoner, even for a slave." He smiled again. "So Terra asks a favor of you."

"A favor?" Partha was startled.

"We ask that the Gath Republic times its first assault to suit our convenience."

"The greater plan?"

"Correct. The chief curse of space-war is that of detecting and intercepting an enemy fleet. The void is so vast and velocities so tremendous that a blip on a screen can come ten seconds too late and a

hundred thousand miles wide of the mark."

"So—?"

"So a great revolt on Gathin will bring the major part of the Kastan fleet here as fast as it can come. They'll just naturally concentrate on a danger-point so near to their home-world of Kasta. Remember, we're only twelve days' flight from there." He gave the same smile once more. "Terra would consider it neighborly of the Gath Republic if you timed your shenanigans for when we've taken up positions to intercept the Kastan fleet."

"And when is that likely to be?"

"Not more than eight days after our beacon has given them Gathin's location."

"It may be a month before they pick up the beacon," complained Partha. "Or two months, perhaps three."

"Not with what we've got zooming around and listening out," answered Wardle. "They are expecting a beacon to function sooner or later, they're hoping for it and constantly seeking it. Finding it is a matter of systematic search and not of haphazard luck. They're likely to trace the beacon and react to it almost any time as from now."

"All right. We'll strike when Terran fleets are ready to take advantage of the situation. Anything more?"

"One item. The doctors have got to make some pretence of coping with the epidemic. But we don't want to play the Kastans' game by curing everyone without exception. So we'd better reduce the number falling sick tomorrow morning. Let's cut it down to two or three hundred and maintain it at that until everyone has had a turn. Foley can explain to Festerhead that he's keeping the trouble in check but it's got to run its course."

"Yes, we can arrange it that way," agreed Partha. "The prisoners are getting psychological satisfaction out of that form of rebellion and so we mustn't drop it altogether. I'll order the number to be kept down to a judicious size."

"I'd like you also to order the doctors to support Foley a hundred per cent next time he argues with Festerhead," Wardle went on. "He wants to blame everything on poor and insufficient food. That diagnosis has got to be unanimous. Maybe it'll get us something better, maybe it won't, but there's no harm in trying."

"The doctors will be told." Partha wet thin lips as he thought of a few crusts of bread in addition to the lousy stew. "Enfeebled Gaths versus overfed Kastans is tough enough. One extra mouthful per meal would serve as a big step toward victory."

"You took a thousand steps when you switched from slaves to potential conquerors. There's less than another hundred steps to go. You'll make it even if you have to crawl, even with empty bellies."

"We shall," affirmed Partha, thoroughly determined. He followed Cheminais outside, his military staff trailing after him.

The door closed. A guard wandered past along the wall-top, kept dozey attention upon the jungle and the sky.

"Things are building up nicely," opined Holden, "to a wholesale massacre by soup-maddened Gaths."

Wardle stretched himself tiredly on his bed. "Let me sleep. I wish to dream of T-bone steaks smothered with button mushrooms."

He closed his eyes, gradually slipped into the unconscious. Holden lay drooling a bit, got off his bed, went to Wardle and shook him awake.

"Aloysius, why are you so cruel to me?"

"Drop dead!" bawled Wardle, aggravated beyond measure.

The guard came to an abrupt halt in the flarepath, stared straight toward the open windows and yelled, *"Fosham gubitsch!"*

Holden went to the window and shouted back, "You heard what the nice gentleman said—drop dead."

"You will not speak dwarf-language," ordered the guard, tough and menacing. "You will go to sleep."

"Yair," said Holden. "That's an idea." Finding his bed, he reposed on it and in due course awoke everyone else with his snores.

Thirteen days crawled past. The sufferers from what Holden called "saponic mastication" had now been further reduced to eighty every morning, merely to keep Festerhead soothed. Doctor-Major Machimbar continued to display lordly indifference to any sick other than guards, but did allow Foley and the others the free run of the hospital.

The beacon functioned twenty-eight hours per day. Nobody knew for certain whether the Kastans were still unaware of it or whether they had found it and were seeking an official reason for its existence. The latter possibility was now filling Partha and his staff with mounting apprehension.

One hundred and forty Stames and Aluesines had changed places with forestry parties from elsewhere, smuggled themselves into all seven adjacent prisons and three of the five that were farther away. They had done good work. All ten jails were now mentally conditioned for revolt and had riddled themselves with soap-disease as a means of maintaining morale through the waiting period.

In the middle of that night Pye was taking his turn to remain awake. He sprawled across his bed, gazed wearily at a spangle of stars gleaming in the window-gaps, counted the minutes toward the time when Casasola would take over. He yawned for the hundredth stretch, fidgeted with boredom.

Faint clicks came from Holden's bed.

Pye sat up wide-eyed and listened.

The bed went on clicking.

Scrambling hurriedly across, Pye snatched up the other's jacket, extracted his pocket-watch. Opening its case he slowly rotated it in the horizontal plane. The clicks faded, ceased, resumed, suddenly became loud enough to awake the whole room.

Pop-pop, pipper-pop.

"Eureka!" exclaimed Wardle. He rubbed hands together in delight and satisfaction. "They're halfway through. Never mind, they'll repeat until they know we've got it."

The seven sat around and listened carefully while the pseudo-watch continued to emit pipper-pops. The sounds went on for ten minutes, ceased for one, started all over again.

"How about me sneaking out to interrupt the beacon?" asked Alpin McAlpin, eagerly.

"Not worth the trouble of getting over the wall," Wardle decided. "I can tend to it myself while working out there tomorrow. Cut off and on twelve times at one minute intervals, that's what you said, didn't you?"

"Yes. We've got to give them an intermittent period to show that we've heard them."

"It'll be done. Doesn't need a radio technician just to work a switch up and down."

"One hour before dawn, five days hence," commented Pye, still listening to the pipper-pops. "That's quicker than we anticipated."

"No matter. They'll keep postponing it so long as they get no assenting signal from us," said Wardle. "We'll interrupt the beacon early tomorrow. Five days should be enough. Besides, I want to get back to Terra. I've had nearly as much as I can take of this dump."

"Me, too," indorsed Pye, fervently.

Holden chose that moment to let go with an unmusical howl of, "Home, home, swe-e-eet home. Be it ever so humble—"

Outside, a guard blundered heavy-footed along the flarepath, shouted a string of incomprehensible words toward the barrack-block. He sounded arrogant and liverish.

Going to a window, Holden looked out and said with mock humility, "You will not speak louse-language. You will go take a walk." Then he ducked out of sight and flopped on his bed.

The watch, now closed and back in his pocket, was still emitting faint clicks in the morning. The same theme over and over again: five days hence, one hour before dawn.

On the last day there reappeared the old menace of a betraying atmosphere. In the yard at eventide ten thousand sat or mooched around with studied listlessness that gave no visual hint of what was coming. Yet over all lay a strange, invisible tenseness that could be smelled and felt.

Again the guards responded to

instinct, sixth-sense or whatever it was. They became fidgety, nervous and tended to group together with fingers on or near triggers. But such was their conditioning that each inwardly sought the cause of his hunch outside the walls or in the sky, anywhere but inside the prison.

Partha came up to Wardle and said, "The men are behaving very well. All the same, the Kastans are sniffing around for trouble. Do you suppose it might be better if everyone left the yard and went to their rooms?"

"It would be a radical break in routine," Wardle pointed out. "Prisoners value this period of petty freedom in which to mix and talk. They never go indoors until they have to. A sudden eagerness to get themselves locked up for the night would arouse the suspicions of a halfwit."

"You may be right. But there's another hour to go. I fear that among so many may be one or two who'll crack under the strain of waiting and do something stupid."

"I don't think that would spoil our plans," opined Wardle. "The Kastans are used to such foolishness. How many prisoners have committed suicide these last four years, and how many did it by inviting a bullet from a guard?"

Partha frowned, said nothing.

"An hour is an hour," finished Wardle. "We've got to sit it out."

He watched Partha walk apprehensively away. Then he leaned against the wall and let his gaze linger on the armory.

Behind those big steel doors lay a treasure that must be won. A direct assault on the armory, or on the platoon at the gate, would bring the attackers under murderous fire from twenty-two guards high up atop the wall. Therefore the wall-top guards would have to be dealt with first. It was going to be tricky and need excellent timing.

Agreed plans were still being viewed and reviewed in his mind when the hour ended and prisoners filed into the barrack-blocks. They shuffled indoors, striving hard to maintain the usual appearance of slowness and reluctance. The natural glumness of the Stames gave them a considerable advantage over the Aluesines at such moments as this.

Now there was only the long night in which to make final preparations. Door-locks clicked shut, guards left the blocks, crossed the yard to their own quarters. The last of them had not gone from sight before Cheminais was out and busily unlocking. He'd had to make an early start, there being enough doors to occupy his attention for three hours.

"Your part of the game completed?" Wardle asked Holden.

"Sure thing. Dareuth will lead the quarry gang in a rush to the garbage-dump. On it are forty old tin cans filled with alamite and complete with detonators." He gave

a wistful sigh. "Wish we could have smuggled more in. There's a big steel barrel down at the quarry. It would have made a beautiful bang if we could have trundled it through the gates."

Wardle gave a shrug of indifference, lay down, arranged his blanket over himself. "I for one am going to get some sleep."

"Can you, at a time like this?" asked Pye.

"Dunno. But I'm going to try." He shut his eyes. The room went silent. Sleep did not come to any of them.

Eventually Wardle found himself at a window watching the regular passing and repassing of a guard and impatiently counting off the hours, the minutes. Now and again he eyed the twinkling starfield. Out in the dark, high up and far away, a big array of black, snouty spaceships waited in ambush. He knew they were there and found the knowledge comforting.

At ten minutes before deadline they were all by the windows. They let a guard go past, dropped a rope to ground-level. Holden climbed over the window-ledge, got a grip, made ready to slide down.

He paused, grinned up into their faces and said with unnecessary loudness, "Hoot M'Goot rides again."

"S-s-sh!" hissed Wardle, "Get down, you imbecile!" He glanced anxiously along the wall-top, was relieved to see no angry figure pounding back.

Holden slid into lower darkness. When the rope ceased vibrating they hauled it up. Looking out and down, they saw his vague, shadowy figure flit across to the base of the wall.

"Two minutes to go," announced Wardle.

They took up cross-bows, wound springs to full tension, placed bolts in grooves and positioned themselves abreast by the windows. Elsewhere were similar scenes, one figure silently lurking by the bottom of the wall, half a dozen armed ones standing behind sixth-floor windows. The night was slightly darker than usual, the flarepath looked more brilliant by contrast.

The guard came back. His movements seemed abnormally slow and lethargic. To nerves drawn taut he appeared to be taking one step per minute.

Wardle whispered, "I'll break the neck of the fellow who shoots prematurely. We want that clunker's gun to fall inside the wall, not outside or on top."

"Don't worry," said Pye, icily calm.

Now the guard came level with the window. Far below, Holden rattled a tin can. The guard halted, stared around. Holden rattled again. The guard unhitched his automatic gun from his shoulder, gripped it in his right hand, bent over and peered down toward the source of the noise.

"Now!"

Six arbelests went *whup-whup*.

For a horrid moment they thought they'd missed. The guard stayed bent, unmoving, apparently still looking down. An instant later he plunged headlong, not having uttered a sound. Spikes caught and tore the legs of his pants, ripped a boot from his foot before he disappeared. His gun landed with a metallic crash that sounded preternaturally loud. The body hit a second later with a sickening crunch of bone on concrete.

Over to the left, just out of sight, somebody atop the wall was giving queer whistling gasps. Farther away, on the other side of the jail, a Kastan voice was screaming bloody murder. A light machine-gun, presumably dropped by the screamer, suddenly came into action with a sharp, hard *taketa-taketa* and the screaming ceased.

Bolting through the door the six Terrans tried to race downstairs and join Holden in the yard. It wasn't easy. In front a solid column of Stames lurched, jostled and half-fell down the steps, jammed together on every bend and stuck until rearward pressure forced them loose. Behind, a bunch of Aluesines yipped with impatience and used their weight to try drive the mass outdoors. Thus the smaller Terrans became submerged in a raging stream of seven-to-eight-footers and remained there until practically flung into the yard.

Already a thousand were out and on the rampage, sprinting to their assigned objectives. Two hundred

from the block adjoining the gates had been briefed to attack the twelve guards there, also the twelve relief-guards sleeping nearby. Most of these were now within fifty yards of the gates and going fast with no opposition.

Wardle and the others kept anxious eyes in that direction as the mob from their own block raced across the yard toward the guards' dormitories.

Those heading for the gates made another thirty yards before astonished guards accepted the evidence of their own eyes. By then it was too late. A big, gaunt Aluesine in the lead swung up a shaped and sharp-edged piece of steel resembling a butcher's cleaver. He flung it at the quickest-witted guard who'd brought gun to shoulder and was fumbling for the trigger. The cleaver missed its target as the guard ducked. A moment later all twelve went down beneath the vengeful mob, not a shot having been fired.

Over to the right another gang was heading for the garbage dump. Beyond them, a large group of former engineers hustled for the power-plant and the vehicle-park. Prisoners continued to pour out the blocks in their hundreds, adding themselves to various groups as previously ordered.

The two Kastans patroling the vehicle-park proved more alert and less dumfounded than their fellows had been. Warned by the rising uproar they took refuge behind a couple of huge trucks, rested guns across steel bonnets and opened fire. Nine oncoming prisoners collapsed and lay still. *Taketa-taketa* went the guns, hosing slugs into the yard.

Splitting up, the engineers dodged around trucks, climbed over them, crawled underneath them. The guards tried to aim and fire ten ways at once. It couldn't be done. Fighting figures came at them from all directions, they went down for keeps, their weapons were snatched from dead hands.

At that point the Terrans lost sight of what was going on elsewhere. Reaching the dormitory building, they were swept headlong through its doors. In front of them a dozen cat-eyed Aluesines raced along a dark corridor as though it were fully illuminated. A few Stames with them were handicapped by lack of light, tended to falter and stumble. Other Aluesines brushed the Stames impatiently aside and dashed after their fellows.

Glimpsing narrow stairs at one side, Wardle gladly seized the chance to escape the press of bigger, heavier bodies. He jerked sidewise out of the crowd, gained the steps, pounded upward as fast as he could go. Somebody was puffing and blowing close upon his heels. Glancing over one shoulder he found Foley following and—somewhat to his surprise—the missing Holden who had joined up somehow. Holden was gripping an automatic gun and was the only one of them armed with a weapon worth

a hoot. Of the others there was no sign. Presumably they were engaged in the melee lower down.

On the first floor the slumbering guards had been brought rudely awake by the general hullabaloo and especially by sounds of strife immediately beneath them. Just as Wardle reached the top of the stairs a huge Kastan, attired only in his underpants, came running out of a room with machine-pistol in hand.

The Terran lacked weight and inches but had the advantage of surprise. What the Kastan had expected to see will never be known but his reaction showed that a recalcitrant prisoner came last on the list. He wasted a valuable moment by letting his mouth hang open and looking thunderstruck.

Wardle used the same moment to belt him in the belly with the butt of his cross-bow. The Kastan let out an elephantine grunt and bowed low, bringing his head down to convenient reach. Wardle promptly walloped him on the nut with all the strength he could muster. The guard flopped with a crash that shook the floor.

Flinging away his cross-bow, Wardle stooped to grab up the precious machine-pistol. It was the luckiest movement of his life. A dozen slugs blasted out the open door, went a few inches above his back, knocked chips from the opposite wall. Plunging flat, Wardle rolled madly out of the field of fire.

"Stay put," warned Holden, still at the top of the stairs. He edged past Foley, crawled cautiously toward the door, poked the snout of his gun around the corner and let fly into the room. Another shower of slugs was his answer.

Obviously those in the room had no intention of surrendering. Their automatic guns were stacked in the armory but each of them retained his machine-pistol. They were going to fight as long as strength and ammunition held out. The grim alternative was lifelong slavery, without honor, without hope. And this was a mighty poor time to try converting them to a strange Terran viewpoint.

Momentarily there was an impasse as the Terrans lay in wait outside and dared not rush in, while the Kastans waited inside and dared not charge out. Then sheer pressure of attackers down below forced the surplus upstairs. The first was an excited Aluesine ceremoniously bearing a large and rusty can on which was the legend IMFAT NOGOLY 111, whatever that meant.

"Give it to me," snarled Holden. He tossed his gun into Foley's arms, snatched the can from the Aluesine. His fingers fiddled a moment at the top of the can, then his arm swung across the doorway and slung it into the room. "Down!"

They all lay flat. IMFAT NOGOLY 111 went off with one hell of a bang that draped a glassless window-frame around a Stame colonel two hundred yards away. Together they dashed into the room.

Eleven Kastans were scattered around with some indecision as to which piece was whose.

The take was eleven more machine-pistols. Now supported by the flood coming up from below, they charged straight into the next room farther along the corridor. It held twelve beds, twelve neatly folded uniforms, but was empty. So also were the remaining rooms on that floor.

Meanwhile the flood swept higher, was greeted on the third floor with heavily concentrated fire. Bodies rolled down the stairs, blocked the way to others. Stames and Aluesines worked frantically to remove the dead. They made another rush, were again repelled.

Evidently the Kastans missing from the second floor had joined those above. Some officer of the guard must have had enough time to organize a stand. Since there were eight floors in the building the defenders had plenty of room in which to retreat higher and higher, making the building's capture costly in the extreme.

It was now plain that Kastans could and would fight with great tenacity. The conquest of the prison was proving harder than anticipated.

Wardle found an Aluesine officer, suggested, "Dead Gaths are no use to the Gath Army. Better withdraw your men from the attack."

"But we've got to take this building at whatever cost," protested the other. "Most of four hundred Kastans are in there."

"Maybe we can get rid of them more cheaply."

"How?"

"We can blow them out. With enough stuff stacked inside we can lift them high enough to meet their own fleet. How's the rest of the battle going?"

"I haven't the remotest notion," admitted the officer.

Then he rocked forward, clutched Wardle around the neck and almost brought him down with the weight. The walls groaned, the ceilings showered dust, the ground quivered. A long strip of distorted steel buzzed through one window and out the other, hitting nobody. Glass rained from windows above.

"The armory doors," exclaimed Wardle. "Now we should have plenty of teeth."

He scooted into the yard, headed for the armory. Halfway there something went *taketa-taketa* and invisible bees buzzed over his head. After that he ran in a sort of leaping zigzag but no more bullets came.

Near the armory the great steel doors sprawled upon the ground, twisted as if by a giant hand. Prisoners were taking out weapons as fast as they could be snatched. Just as he arrived Cheminais and two Stames shoved out a heavy machine-gun mounted on two wheels.

"Four more of these gadgets in there," informed Cheminais. He narrowed his eyes at the yard, part of which was conspicuously unoccu-

pied. "The gate guard went down like skittles but the relief-guard is holding out. They've locked themselves in the guardhouse and are well armed."

"Oh, so that's who fired at me just now?"

"Yes, they've light automatic guns covering half a dozen narrow arcs around the building."

"But now we smack back at them, *houne?*" put in a Stame, mournfully happy. "We teach them a lesson, *houne?*"

"Any explosive in there?" asked Wardle, jerking a thumb.

"Only a dozen kegs of that quarrying junk," said Cheminais.

"That'll do. I'd better find Holden fast. He knows how best to use it."

So saying, he hastened back, his mind occupied with the potency of a ton or more of alamite. The distant gun opened up immediately he entered its arc. He took a dive, lay still. The gun ceased. Carefully he edged forward. *Taketa-taketa.* Whoever was behind that gun had good sight and poor patience.

The bullets came very close. One plucked at his shoulder padding, ripped a slice out of the cloth. Another struck concrete a foot from his nose, ricochetted skyward with a noise like that of a buzz-saw.

Another pause, during which sweat trickled down his spine. Slowly he raised his head. *Taketa-taketa.* This was not more than a one-second burst because immediately it was answered by a faster, heavier hammering from the yard. *Gamma-gamma-gamma* sounded Cheminais and his Stames. The distant gun-post dissolved into chaos as a stream of small explosive shells sprayed all over it.

That was good marksmanship in the hazy half-light of coming sunrise. Wardle got up and ran. In two minutes he was back with Holden who examined the kegs and pronounced them very bangworthy. Thirty Stames at once dragged the lethal load to the dormitories, lugged it up to the second floor, stacked it in a middle room.

Not knowing what was taking place the Kastans on the third and higher floors made no attempt to interfere. They sat tight and awaited further attacks from enemies swarming beneath.

While well-armed Stames and Aluesines kept close watch on the rising stairs, Holden primed the pyramid of kegs, got everything ready.

At that point Wardle appeared with one of the captured gate-guards. The huge Kastan was completely submissive and already had assumed the status of a slave who exists only to obey.

"You will go up to the next floor," ordered Wardle, "protecting yourself by shouting your identity in your own language. You will tell all those above that they must surrender at once or be blown sky-high."

Unhesitatingly the Kastan agreed, as a prisoner must. No thought of

refusal or trickery entered his mind despite the current bad example of which he'd become a victim. He mounted the stairs, bawling a warning.

"This is Rifada. Do not shoot—I am Rifada."

He reached the top, turned out of sight onto the third floor. There was a brief silence while those below strained their ears to listen.

Then, "Guard-Sergeant Kling, I am ordered to tell you that all must surrender or be blown up."

"So! And you a prisoner of prisoners, eh?" A pause, followed by, "He comes up here and invites us to share his disgrace. Death is better than that." Another pause, then a short, sharp, "Kill him!"

A dozen shots blasted. Something made a dull thud on the floor. Aluesines and Stames cast each other the knowing looks of those who'd expected nothing less from a piece of Terran super-optimism.

Wardle made a gesture of mixed despair and disgust. "That settles it. We can do no more in these circumstances. Let 'em have it."

Two Aluesines remained at the bottom of the stairs to oppose a possible last-minute rush from above. All the rest hastened out of the building, placed themselves at a safe distance. Holden went into the middle room, stayed there a few seconds, came out like he'd been seared with a red-hot poker.

Taking their cue from this, the pair of Aluesines abandoned their post, followed him down and out at breakneck pace. They joined the crowd, turned to watch results.

For a short time the big building stood stark and silent against the growing light of morning. Then its walls bulged. Came a tremendous roar and the whole edifice burst apart. A great vertical column of dirt, dust and vapor arose skyward with darker lumps soaring and falling within it.

By a freak of chance characteristic of explosions eighteen Kastans survived the blast, bruised and badly shocked but otherwise whole. The dirtiest and most bedraggled of these was Guard-Major Slovits. He crawled out of the mess, stood up, felt himself all over, gazed around with a completely befuddled expression.

Holden brought him to his senses by tapping him on the chest and announcing, "Henceforth your sole purpose in life will be to please me. Is that understood?"

"Yes," agreed Slovits, demonstrating that one man's poison is another man's meat.

"In no circumstances will you disobey."

"No," confirmed Slovits, horrified at the thought of outraging a well-established convention.

"Therefore," finished Holden, pointing across the yard, "you will march these former guards in a smart and military manner to General Partha-ak-Waym and apply to him for immediate enlistment in the army of the Gath Republic."

Slovits stood staring down at him

from his greater height. His heavy body swayed slightly while a peculiar series of emotions chased each other across his broad, leathery face. His lips worked but no words came out. Then suddenly his eyes closed and he slumped without a sound.

"Holy smoke!" exclaimed Holden, surprised. "The big ape has fainted."

"What do you expect when a warrior plunges into his living grave and is immediately hauled out by his enemy?" asked Wardle.

The guardhouse fell within half an hour, gave up twelve Kastan dead who'd fought to the last gasp. The prison's conquest was now complete but activity did not lessen in the slightest.

A blue flag with white star was nailed to the pole above the administration building, formally saluted and informally cheered. Stretcher parties collected the wounded, rushed them to the hospital where the doctors took charge. Other parties sought among the dead for Festerhead and Machimbar, found neither, both having had the good fortune to be absent when the balloon went up.

A triumphant column one thousand strong roared out in captured trucks and thundered along slave-built jungle roads. Four hundred were armed with light automatic guns, four hundred with machine-pistols, two hundred with hastily-made alamite grenades.

They reached the next nearest jail in time to take part in the final assault. Again the Kastans had fought with bitter determination born of the belief that the only alternative was a lifetime of damnation. Three hundred and seventy died in their boots. Forty-eight dazed Kastans accepted salvation in the ranks of the growing Gath Army.

The column sped forth again, now doubled in size and fire-power. It passed Festerhead and Machimbar on its way to the next jail, meeting them sitting pop-eyed in an official car, leaving them dead-eyed in a smoking wreck. The third and other prisons toppled in turn. By the fall of the tenth the column had become an army of which only one in seven carried a modern weapon.

A surprise assault in full strength upon a garrison town remedied the arms-shortage, provided lavish quantities of ammunition, added seven hundred mentally confused Kastans to the ranks. Here, the Gaths also gained their first heavy artillery in the form of ten mobile batteries of dual-purpose guns.

A side-swipe in force at an inadequately defended airfield won them four small space-cruisers in fighting trim, also sixty-two jet planes. One-time painters daubed out the double-arrow insignia, replaced them with a white star. Former pilots, navigators, space-engineers and gunners piled joyfully into the

ships, took them up, plastered enemy airfields elsewhere.

Electricians and telephone engineers cut power cables, tapped lines, listened to unwitting Kastans talking from afar, bollixed them with fake messages, passed constant information to the Gath Field Intelligence Service. Scout-planes fed the headquarters staff with news of enemy movements. Radio technicians monitored Kastan broadcasts with captured equipment, added their quota of valuable details. Swiftly the Gaths had reached the stage of waging war systematically, knowing what they were doing and why they were doing it.

A small, judiciously estimated quantity of nuisance value had been placed in a suitable environment where it had fermented like yeast in a brewery vat.

On the ninth day of the revolt a flaming battleship fell through the sky from somewhere where twinklings and vivid flashings had concentrated among the stars. On a hilltop it made a meteorlike crater surrounded by gobs of molten metal. Faintly discernible upon one distorted slab were the tips of two white arrows.

The same night eleven more ships plunged down white-hot, illuminating the jungle for miles. One was unidentifiable. One carried the sign of a Terran comet. Nine bore paired arrows.

Upon the tenth day Wardle and the others bounced and jolted in a

racing truck that was part of a gigantic column pushing forward nearly a thousand miles south of the prison. Their driver was Gath-Major Slovits, the only one aboard big enough to hold the huge steering-wheel and reach the big foot-pedals. Slovits, revelling in unexpected freedom and new-found honor, was by now the Gathiest of the Gaths.

A mobile radio unit operating by the wayside drew their attention as an Aluesine sergeant, standing near it, waved them down. The sergeant came close, his cat-eyes examining them curiously.

"You Terrans are wanted at Langasime."

"That's a day's run rearward," complained Wardle. "The fighting is ahead. What's the idea?"

"They're calling for you over the air. You're wanted at Langasime as soon as you can get there."

"Who wants us?"

"A Terran frigate has landed. They say the enemy fleet has suffered severe loss and that our conquest of Gathin is only a matter of time. Union forces are massing to attack Kasta itself."

"Hm-m-m! By the looks of it we're being ordered home."

Wardle showed disappointment, stood coping with a moment of chronic indecision. A truck lumbered past hauling a tank of paralyzing gas and its long-range projector. Three white-starred jetplanes swooped over the advancing column, rocked and swayed into the distance. The horizon spewed smoke and faint noises, the *taketa-taketa* of light automatics, the *gamma-gamma-gamma* of heavy machine-guns, the brief, deep *whoomps* of alamite bombs, large caliber mortars and dual-purpose guns.

Reluctantly he gave way. "Oh, well, maybe they've something else in mind for us." Then to Slovits, "Take us back good and fast."

At the dilapidated and bomb-cratered Langasime spaceport the frigate's captain came down his gangway to meet them. He was tall, young, dapper, and spoke with an air of weary resignation.

"At H.Q. they need their heads examined. I've been ordered to pick up the Special Task Force—in a frigate." His attention settled on Casasola. "I suppose you fellows are part of it?"

Casasola said nothing.

"We fellows," informed Holden, "are *all* of it."

The captain frowned disapproval while he sought around for the gag. Failing to find it, he remarked incredulously, "What, only seven of you?"

"Yair," said Holden, donating an irritating smirk. "Good, *houne?*" He turned, made a motion of farewell. "Best of luck, Slobovitch."

"Slovits," reminded Slovits, with extreme politeness.

THE END

FOR THE FIRST TIME

The gentleman got exactly what he asked for—but the terms of his desire were a bit limited; he wanted life.

BY C. L. COTTRELL

Illustrated by van Dongen

It was just a short letter to the Institute. It requested the Institute to forward a copy of the death certificate to the company in order that they might close their files on Mr. Eric Ryman.

The answering letter to the Continental Insurance Company was almost as short. In essence it said that they could issue no death certificate on Mr. Eric Ryman, and that since the company had called their—the Institute's—attention to the policy issued to Mr. Ryman, they—the In-

stitute—were enclosing a claim for the amount of—irrelevant—as related in Coverage "E," page four of the policy.

Eyebrows were raised and lips were pursed at the Home Office of the Continental Insurance Company. And since the home office was only a half a day's ride from the Institute for the Treatment of Mental Disorders, an agent was dispatched to investigate the reason for the rather irregular event.

"Come in, Mr. Shipley. I'm Dr. Jarvis."

"Dr. Jarvis," acknowledged Shipley as they shook hands. He sat in the chair indicated by Jarvis opposite the aluminum and paneled oak desk. He declined a cigarette, laid his briefcase on the edge of the desk after removing some papers, and sank back in the chair.

"Now," he said, "what's this business about no death certificate for Eric Ryman? According to our information Ryman entered this institution and had never been released."

Dr. Jarvis immediately liked the insurance man's informality. It set them both at ease and made presentation of the unusual facts easier. He smiled and said, "That's true. October 18, 1958, he was committed."

"Uh huh," said Shipley consulting one of the sheets he held in his hand. "He took out his policy about five years prior to his committal."

"We didn't know about the policy until we received your letter asking for a death certificate. It was among his personal belongings that we hadn't examined for years. It's Coverage E that we're interested in."

"Ah, yes. Coverage E. Dr. Jarvis, we can do nothing about that until we have some proof of the date of his death. The pro-rated amount due you will be paid on issuance of a death certificate."

Dr. Jarvis slid his chair back carefully, arose from behind his desk and walked slowly around the front of the desk, his chin cupped in his hand. He seemed to be trying to make time in order to choose the words he needed. He stood and looked down at Shipley. He said, "This may come as a light form of shock to you, Mr. Shipley, but there can be no death certificate. Eric Ryman is not dead."

It was a surprise to Shipley. His face showed it. He stood up quickly, his papers falling to the floor. He ignored them. "I don't believe it!" he said. But as he looked into Jarvis' face, he saw no hint of odd humor there and he knew Jarvis was speaking the truth.

"It's true," Jarvis said. He walked back to his chair and sat down again before speaking again. "Eric Ryman is alive and here."

"Eric Cornel Ryman?" said Shipley, his mind unable to grasp the fact. "Are you sure we are talking about the same Eric Ryman?" He knew he need not have asked the last question. Ryman had been traced by his company to this Institute and he had never been released. There was no doubt about its being the same

Eric Ryman. Still his mind refused to believe it. Proof was necessary, not only for him, but also for his company. And if it were true, if Ryman was still alive, then his company was obligated financially to an extent which their actuaries could never have anticipated.

Shipley carefully selected a cigarette from the pack proffered by Jarvis, lit it, and inhaled deeply before speaking. "Tell me all about it, Dr. Jarvis."

The Reverend Elwood Taylor dropped heavily into the chair that stood beside the hotel bed. He had just finished shooing away the last visitor and had spent more than an hour giving an account of his work for God and his own background from his childhood up until now. He really considered it a nuisance to repeat those things to the reporters town after town, but it was necessary. Any little word they could give in the interest of God was helpful in this world that sorely needed the word of God. His main objection to them was that many of them called him a "faith healer." It was a term that he did not like. He didn't consider himself a faith healer. Rather, he thought of himself as an agent directly appointed by God who transferred His miraculous healing power to him.

How many people had he cured across the nation? He had no idea. He never counted them. Many disbelieved the actual power of healing through faith. Those he could not always help. One had to believe, to have faith in order to be healed. Those who had faith he invariably healed, even when the people had been given up by physicians and surgeons as hopeless incurables. He personally wanted no recognition; he wanted only God to be recognized as the healer. He was just an instrument, the same as the scalpel of the surgeon or the physician's hypodermic syringe filled with antibiotics. He himself had no knowledge why God had chosen him through which to work. He knew only that he had to do the work, and he thanked God daily for permitting him to act for Him.

The Reverend Taylor rubbed his tired eyes and started for the bathroom. A hot shower would be a kind finish after this tiring night's session of prayer and healing. The healing lines got longer and longer with each session. What a pitiful case had been that arthritic woman who had sought to regain her health! He had felt sure from her manner that the woman had been uncertain of God before he had made her well again. But the light of love and faith in her eyes when she walked away healed, her hands and legs untwisted, freed from agony, had sent an indescribable thrill through him. And that child whose body was being wasted by diabetes— But now they were whole and healthy again, all of those who were in the line tonight.

The preacher's reverie was interrupted by a light knocking on his

open door. He almost groaned. But he straightened up and opened the door.

The little man framed in the doorway looked up at the preacher. "My name is Eric Ryman," he said, his eyes darting around the room taking in the walls, the furniture. "I'd like to come in."

Before the preacher could protest, the little man had pushed his way into the room and closed the door behind him. Then he turned and stared at the preacher, unblinking, speculative.

Reverend Taylor had frequently had experience with rude and unnormal people. But he tolerated them kindly since, he reasoned, they were some of God's creatures. Although he was greatly annoyed at his visitor's late hour intrusion and his presumptuous manner, he swallowed his momentary anger and decided to treat the man kindly whatever the purpose of his visit.

"I'm an electronics scientist, Reverend Taylor. I'm engaged in a line of research which I'm not at liberty to say. For every discovery I make, another dozen possibilities present themselves." He leaned forward, his eyes gleaming preternaturally. "I need time, Reverend, time. Time so that I can continue my research. Years and years of time."

Reverend Taylor did not understand what all this had to do with him and why the man had come to see him. He said, "What do you want of me?"

"Time, Reverend Taylor. Time."

"I don't understand," said the preacher, puzzled at the man's awkward, disjointed conversation.

"You are not using your powers to their fullest extent, Reverend Taylor."

"God's power," corrected the preacher.

"God's power," echoed Ryman accepting the correction. "All you have done is heal the physically sick. The *physically* sick. Why not the mentally ill?"

Why not the mentally ill? The thought roiled around in the preacher's mind. Why not? Was it beyond his power? He didn't know. Why had it never occurred to him to try curing the mentally ill? It just hadn't, that's all. He had not once used his God-given power to heal the mentally ill.

"Or the aged?" said Ryman.

The new thought struck home. His mind swirled more, and thoughts born of Ryman's last words flooded his mind. *Could* he do anything about the aged? Smooth their wrinkles, revitalize their worn-out hearts and organs, cleanse the senility from their brains? Was it possible for him to—

"What do you want from me, Mr. Ryman?" the preacher asked in a voice so low it was barely audible.

"Immortality, Reverend Taylor. I never want to grow old. I must have time for my work. You *can* do it. I know."

The preacher licked his lips nervously. Slowly he moved over to the

edge of the bed and sat down, his gaze intent on Ryman. "How do you know?" he asked in a whisper, his throat tight, and his palms moist.

"God told me."

The preacher's eyes narrowed as he scrutinized Ryman. He wondered if he were dealing with a madman. But hadn't God told him to use his power for healing? Could not God also have told this man, Ryman, to seek out that power for a special purpose? Perhaps Ryman was sent to him by God to reveal the full extent of the powers he had. For a full two minutes the preacher let the thought churn in his mind. Then he said, "If it is God's will, Mr. Ryman, then so be it."

The preacher stood up and stretched out his hand and placed it on Ryman's head. His eyes turned upward toward the realm of God. He started his Healing Prayer.

"Oh, God—"

The words were forceful, beseeching God to bestow everlasting youth on Ryman. Ryman sat with eyes closed, accepting the prayer and feeling the power of the hand resting on his head course through his body, electric and dynamic, tingling and permeating every molecule of his body. For seconds it continued then suddenly stopped, as it had begun. A new completeness filled Ryman's body.

He had completed the first part of God's orders.

Now to complete the second part.

Ryman pulled his hand from his pocket. The preacher's eyes showed his shocked surprise. His face blanched and he moved reluctantly to the chair opposite the door. He sat down slowly. He looked at Ryman in a new light, realizing now fully that he was dealing with a madman.

"Mr. Ryman, what . . . what—"

"Thank you, Reverend Taylor," said Ryman. "Now I'll never die." And he believed it. *Knew* it. He looked gratefully at the preacher and raised the revolver and fired two shots into the preacher. The slugs flung the man backwards and he slumped to the floor without a sound. His glazing eyes looked reproachfully at Ryman, and Ryman answered the silent question in them: *Why? Why kill me?*

"God told me to do it," he said simply.

"And that's how it happened," said Dr. Jarvis. "For the first time in history of humanity a man is going to live forever. We have reconstructed this much from what Ryman could tell during his rational periods. He was, of course, immediately incarcerated and then committed to this institution as a homicidal maniac."

"When did you first suspect his condition of unusual longevity?" asked Shipley, his mind hesitating to believe what he had heard.

"Ryman was about thirty-five when he was committed. He had been here about ten years before anyone began to wonder out loud just why he was not showing his chronological age. In another ten

years the geriatrists, among others, showed intense interest in Ryman's condition. In still another ten years the geriatrists were going wild trying to find out what made Ryman tick the way he did—does. They did everything short of vivisect him in an effort to learn the reason for his youthfulness. By then a re-examination of his case history disclosed the episode of the preacher's bestowal of immortality on Ryman."

"Wasn't this all brought to public light?" asked Shipley.

"Yes indeed. It was *the* mystery of its day. But like everything else it soon lost its zest in the public eye and died out. Every now and then it is revived in print, but it arouses interest for a little while then dies out. I imagine your company's interest in this case will trigger the story again for this generation."

"A most incredible story," said Shipley. "And his longevity—his immortality is attributed to the preacher whom he killed in his madness?"

"One of a number of schools of thought," said Jarvis, "account for it that way, that the power of the preacher—or God, if you wish—was bona fide and that he actually did bestow immortality on Ryman. Another is that Ryman is a naturally born immortal. Many think it was inevitable. Of all the billions of people who have been born since the evolution of man, why shouldn't there be one born to live indefinitely? The third school of thought is that sometime in his life Ryman ate a combination of foods or drugs or something that gave him his immortality. That to me is a farfetched theory, and the weakest of the lot. The fourth is that he himself *believed* the preacher endowed him with the right to live forever, and that belief is locked in his mind. Some condition governed by that belief might actually be giving him immortality. The fifth and most widely accepted reason of those who know of this case to date is that the preacher was born with a unique psionic talent that gave him his healing power and the power to give longevity, a power which he apparently did not realize he had."

"If Ryman is destined to live indefinitely, then financially that throws a burden on our company," mused Shipley aloud.

"Call it an occupational hazard of the company, if you wish," said Jarvis. "The fact is Ryman is here, incurable, unless someone can repair a damaged brain, and he will be here for at least a thousand years."

"What's that?" asked Shipley.

"Ryman does show some signs of geriatric deterioration, but the rate is so slow that those who can measure it think that Ryman will reach a 'normal' old age in about a thousand years. But don't depend on that. There are others who do not agree. At any rate, another five hundred years or so should tell. But we won't be around to worry about it, will we?" He smiled.

"A thousand years or ten thousand years doesn't matter much. My com-

pany won't be in existence that long," said Shipley. "But about Ryman being incurable, I don't think I quite understand. I was under the impression that now the curing of a mental patient is a rather simple process."

"It is. Now. But at the time Ryman was committed there were no methods developed as we know them today. Ryman was diagnosed as a psychotic. There was no direct curative measure in those days. Hit and miss only. His case history shows that he was quite violent. Completely intractable. He was given various types of therapy. Included among these were the electric-shock treatment and the drug shocks. The injury to the brain cells was, of course, barbarous and permanent. But not nearly so barbaric as a treatment they finally gave him, a form of 'surgery' called prefrontal lobotomy in which the forebrain was more or less randomly shredded with a thin bladed instrument. The damage was almost as great as if the forebrain were removed entirely. It was not a cure for insanity; its purpose was to make the patient tractable."

"It seems to me I've read of that ancient form of surgery," said Shipley.

"Probably have," said Jarvis. "Such a practice was a stigma on psychiatry for many years and was naturally doomed to extinction as the true nature of thought generation became known. The worst psychotic would not spend more than a year in any institution now."

"And he'll never change, never be normal again?" said Shipley.

Jarvis shook his head. "Not unless some time during the next thousand years some bright doctor devises a way of going into a man's brain and repairing the cells and nerve tissues one by one restoring them to their originality. Which would be quite a trick."

"Would you like to see Ryman?"

The room was small, but nicely furnished. Shipley noticed that it had a private bath. A bureau was on one side of the room and a chest of drawers on the other side. The bed, a three-quarter size, was in between with its head against the third wall. Alongside the bed near the bureau was a low table with a small model stereovision set. In front of the silent, inactive set Ryman sat at the table working the pieces of a jigsaw puzzle. He was frowning in obvious concentration over the partly finished puzzle. He looked around at the two men after they had stood behind him watching him for a few minutes.

"Hello, Dr. Jarvis," he said. He looked at Shipley and said nothing.

"This is Mr. Shipley, Eric. He has come about your insurance."

The man concentrated on the puzzle, moving pieces around and picking one up to see if it fit the empty space he was working on. It didn't. He tried another one before he answered. It didn't fit either. He said, "My insurance? I got insurance. Some other time maybe?"

"Mr. Shipley is not here to sell

you insurance. He wants . . . well, never mind."

On a shelf under the table was a cardboard box with a stack of jigsaw puzzles in it. Shipley estimated three dozen puzzles in it. Stacked alongside the box were some comic books, most of them worn from much use, or misuse. A Bible, also worn, lay on the other side of the box.

"Good-by, Dr. Jarvis," said Ryman without looking up from his puzzle. He said nothing to Shipley.

"Good-by, Eric. I'll stop in after supper."

Shipley was glad to get out of the room. There was something about a man that read comic books and did jigsaw puzzles— He certainly didn't look over thirty-five. His shoulders were rounded from bending over his puzzles too much. And his eyes had an unalive look to them, as if he were just existing, not living; uncaring what was going on around him.

In the hallway Jarvis said, "That's the extent of his choice of activity, the puzzles. He has lots of them. Tries to finish them but rarely succeeds. He can't concentrate long enough to finish them even though he does the same ones over and over. He's been doing the same ones repeatedly for as long as I've been here, and that is nearly thirty years. One of the results of the prefrontal."

What, wondered Shipley, would a thousand years from now be like. He pictured a civilization in his mind, a great network of cultures stretching from planet to planet, and even from star to star. And while men were wresting with the frontiers of the galaxies, Ryman would be moved from hospital to hospital as each in turn aged and crumbled to dust around him. And he would sit impassively putting together jigsaw puzzles, frowning at them then abandoning them unfinished as his incomplete mind drifted aimlessly to other matters. Shipley shuddered inwardly and said aloud, more to himself than to Jarvis, "What a waste of *time!*"

Jarvis looked at him and said, "Isn't it."

Back in his office Dr. Jarvis said, "How is it that your company has not investigated Ryman before? Surely your IBM didn't make an error?"

Shipley smiled at the notion. "Only those who feed the machine data, or those who fail to feed it data. The fact is that the IBM does not forecast the death of a policy holder. Under most other circumstances the case would have come to the attention of the company sooner. Such as the cause of an unpaid premium. But the premiums on Ryman's policy were paid out of a premium deposit account previously established by Ryman. The payments were, of course, automatic until notification of Ryman's death, or until he reached the age of ninety-nine at which age the policy became a fully paid policy until death.

Since he reached the age of ninety-nine and no death was established, the machine became inactive as far as

his account was concerned. It would become active only in the event of his death or a claim under Coverage E, or, as actually happened, a mechanical breakdown of the IBM which resulted in an examination of inactive accounts. Naturally, we thought Ryman must have died, so our letter to you. After all, who would expect a man to be alive after one hundred and thirty years—except an IBM?"

Shipley left the Institute a little later to return to his home office. His thoughts were a little glum. They won't believe me at first, he thought. He knew his story would evoke comments about his returning to the Institute for treatments himself. But they would believe after proof, and it wouldn't be so funny when they realized that Coverage E was valid for at least a thousand years, barring accidental death, and the company would be bound to pay the hospital and medical expenses until the death of the insured.

THE END

THE ANALYTICAL LABORATORY

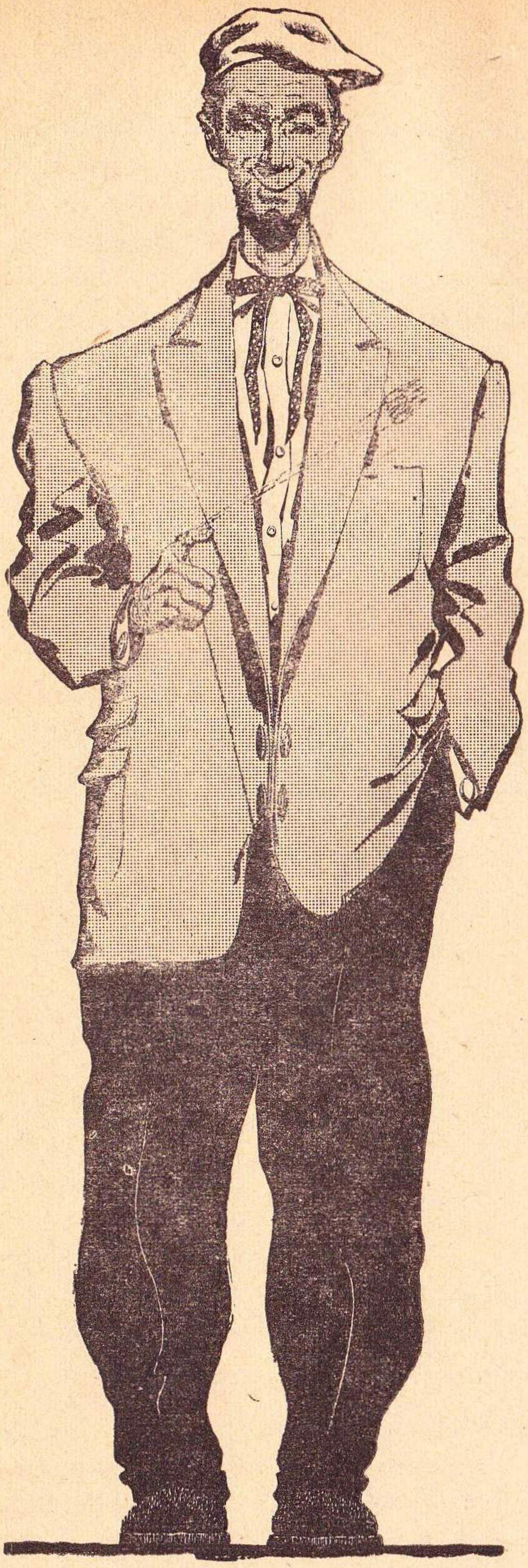
We have two months issues to report on—and several requests for information on "How do you get these 'point scores'" have come in from readers who joined up since it was last explained, so we're cramped for space.

Point scores: Letters voting on the stories come in; we score the votes on a basis of a vote for first place being 1 point, while a vote for third place counts 3 points, et cetera. The total number of point-votes each story gets is added, and divided by the number of votes on that story. If a story accumulates 666 points, from 200 letters, it has a point-score of 3.33.

We normally pay 3¢ a word for stories . . . *but* the story your votes put in first place earns an additional 1¢ a word, for our maximum bonus rate of 4¢ a word. Second place wins a ½¢ a word bonus. Therefore, your reader votes are of very real interest to the authors—and if an author genuinely pleases you, you can distinctly please him in return.

(*Continued on page* 145)

Illustrated by van Dongen



THE EDUCATION OF ICKY

Icky was a genius—and in the exact, original, literal sense. But he was a little out of date—but the effect of an educated genius of his type. . . .

BY LEE CORREY

Joe Ramsey was a trained engineer, but that didn't keep him from being a complete screwball. That is understandable, however, when you consider that he was also a rocket engineer and, therefore, was proof of the old saying to the effect that being crazy aids and abets a man in that field.

After playing around all day with high-altitude sounding rockets, you'd think Joe would be content to sit at home in the evening and soak up the television screen. But not Joe.

He had two professions in reality.

Rocket engineering was only his legitimate one.

On the side, he practiced magic—both black and white, but more of the latter.

It all came to a head the night after one of Joe's expensive skyrockets flopped horribly. Instead of soaring aloft to an altitude of some four hundred miles carrying instruments to study the Störmer current ring, it returned in an ignoble fashion to the desert floor—nose down, power on, and going like the proverbial bat out of hell. Joe went out to look at the crater and called it a day; there was no use trying to recover any pieces after an impact like that.

He whipped up his usual bachelor dinner and managed to burn the liver and onions. This was unusual because Joe was a good cook—probably because he did a little alchemy on the side. He controlled his temper, but by the time he'd finished cooking hamburgers and a can of beans, he was mightily upset. And after he finished his dessert of canned prunes, he was in an even viler mood.

All of this caused him to give up the notion of conjuring his elemental that night; he was in too lousy a mood. Of course, Joe didn't realize that his "elemental" was actually the thin, pale girl who lived on the floor above and who could hear him summoning an elemental by way of the air ducts. She was lonely and—something which is more appropriate for an elemental—without scruples.

"It should have worked!" he kept telling himself aloud as he gazed morosely at the mess he'd made of his kitchen. "That regulator should have worked! It tested out fine! The systems analysis was good! It worked in the launcher during the dry run! So why doesn't it want to work sometimes in flight? And why did that nozzle throat burn through?"

Any other engineer would have gone looking for cause and effect—physical cause and effect. But Joe didn't work that way; his mind had queer little twists of its own, just like the electronic brains in some of his rockets. He conceded to himself that rocket motors, regulators, the weather, and propellants were just about as wild and unpredictable as magic. After all, it was close to sheer magic that most things like that worked, failed to work, or performed as they did at all.

Flopping his elbow on the table, he kept talking to himself as ideas ran through his head. He didn't mind talking to himself, because he didn't get into arguments and his listener would keep listening. "I wonder," he mused, "if I have somebody on my crew who hexes regulators? Couldn't be me; I broke myself of the nasty habit of hexing watches and fuel pumps, so I must be pretty impotent along that line for a while yet. Well, there's only one way to find out. I'll look up the

procedures for un-hexing and try that."

He got up from the table, walked over to a closet door, produced a key and unlocked it, and stepped inside. He made a careful search of the jammed bookshelves and selected three tattered old volumes. Then he sat down under his reading light, turned on the television to provide background, and started searching.

As he was thumbing along, he hit a chapter in one book entitled "The Positive Approach of White Magic."

"You know, I think I may be going at this in a backward fashion," he told himself. He agreed with that and went on, "What I want is some positive action here. It would be much more powerful if I could build a regulator that was completely hex-proof." But he kept looking and finally told himself in disgust, "No data. Nowhere does it say how to do something like that. Joe, old buddy, I think maybe you will have to go back and start from scratch."

He got up and poured himself another cup of coffee. Then he thought about this for a while. He had had extensive experience with the arcane sciences—experience that was just about as broad as his experience with rockets. But he knew he didn't have the background or training to start from the beginning in working out the method of building a hex-proof regulator and rocket power plant. In the first place, the physical mechanism itself was too marginal and complex.

"I might try the Devil," Joe thought. But no, the Devil didn't know a thing about rockets that Joe could recall. Besides, Joe couldn't call him, although he'd tried. Somehow, the casting of the spell just didn't work for him, and he was not anxious to lose his soul just for one rocket.

Then the obvious answer occurred to him. A jinni, an arcane servant of man, a being which would do your bidding and help you out. He jumped up again and grabbed his little loose-leaf notebook which contained in the front section various useful rocket equations and, in the back, assorted useful spells. In ten minutes, he had it all figured out.

He would, of course, have to make the talisman for Aquarius. The Water-Bearer more or less supervised the jinn of alchemy, metals, jewels—and, by concatenation, metallurgy, physical chemistry, and engineering.

"With the wisdom of the ages to call upon, a jinni could help me out on this problem," Joe told himself as he started getting his gear together. "And if there is a hex on that regulator, a jinni can break it or build one immune to hexing!"

He had to go outside with his .22 and pop off one of the swallows that hung around the eaves of the apartment house. Swallow's blood was a must for inscribing the talisman. He had the other things—the iron knife with the arrow-shaped point, the reed pen, the white paper cut in the shape of a hexagon. These were as much tools of the trade as his slide rule.

By eleven-thirty that evening, he was ready to crank up and get going on the ritual. Conjuring a jinni was one of the simpler rituals, requiring only the talisman and the invocation. But Joe had never tried it before. According to his translation of the Kabballa, it should work.

Making sure all the doors and windows were tightly covered or locked, he took a deep breath, picked up the talisman, and began to chant:

"In the name of Sulaiman, son of David, oh jinni of the power come near to me and permeate me with thy power. By him who made you his slave by his Seal and word, I command thee. The good jinn have been put on the Earth to serve men and to serve those invoking the name of the great, the wise Sulaiman. Thou canst not disobey his command through me. Come now, oh jinni, by thy Master's name, and by the Seal—"

Joe fell silent. Nothing happened. There was no mighty crash of thunder. No fire. No smoke. No towering jinni. He sighed and tried again. These things sometimes took a while—

As he was working through it for the third time, there came a knock on the door. He jumped, settled down again, and quickly shoving the talisman into a desk drawer he called out, "Who's there?"

"Man-n-n-n," a slow, artificial drawl came through the door, "I'm here! Dig? Lemme in, man!"

"Now what?" Joe asked himself and stepped to the door. When he unlatched it and swung it open, he found himself staring at a tanned little man with a trim goatee, a beret, a gaucho shirt, pegged trousers, and blue suede shoes. He stood there quietly with a silly grin on his face twirling a long key chain with his right hand.

"And what do you want?" Joe asked.

"You called, man? Cool, here I am!"

"Huh?"

"I'm Icky—otherwise known to the jinni trade as Ali-ben-Hasdra Ikbal, servant of the great Sulaiman and devoted jinni of the Caliph Ben-Yussef! Now, were you just fooling around for kicks, or did you really want a jinni for something? This is the first time I've been around for a couple of hundred years, and I'd hate to have to trot back right away without digging what's jamming these days."

"Come off it!" Joe snapped. "You're no jinni!"

"What's the matter, man? Don't you dig me? Isn't this Twentieth Century America?"

"Yes, but—"

"Then what's devouring you, man?" Icky asked. "Your wish is my command, but I'd like to drag in out of this crazy darkness."

Joe stepped back and let Icky in. The jinni peered around the apartment curiously. "Some layout!" Icky said with a whistle. "I wouldn't believe it if I hadn't seen it!"

"Look," Joe snapped at him, his patience about exhausted, "you're no genuine jinni! Jinn come equipped in Arabian clothes and they don't talk outmoded bop."

Icky grinned. "Man, I will promptly proceed to prove to you real quick like that I am a real jinni." So saying, he made a pass in the air with his hands, and gold coins rained from the ceiling of Joe's apartment.

"Nuts! I've seen better acts on the stage!" Joe told him.

The jinni was unperturbed. "O.K., man. How about a real cool trick? Want me to make that wall over there disappear and be in the middle of Washington Square in New York?"

"Again I say nuts!" Joe pointed to his television screen where, in full color, was appearing an on-the-spot travelogue of Australia sent across the new trans-Pacific television link.

That was too much for Icky. He sat down. "I heard about all this—but I didn't believe it," he said sadly. "Abdulla ben-Shah told us that magic didn't mean anything any more, that it didn't impress people at all these days. They just figure it's some new scientific stunt. O.K., I give up . . . but I *am* a jinni!"

Joe sat down, too. "O.K., I'll believe you until something tells me otherwise. This is the first time I've conjured a jinni—"

"Not many people do it any more. I've been waiting ever since Elizabethan England," Icky admitted. "Say, do you still drink coffee?"

"Sure. Want a cup? You must have had a long trip," Joe said as he got up to refill his own cup.

"Man, that's a real cool idea! Say, what did you expect when you conjured me, anyway?"

"Oh, I expected you would show up in a cloud of fire and smoke rearing ten feet high," Joe remarked as he poured coffee. He was getting to like this jinni; the fellow seemed almost human in some respects.

"Don't be cubical, man," Icky told him. "In the first place, that stuff is strictly to impress the peons. These days, it doesn't work."

"Oh," Joe said as he handed Icky a cup of coffee.

"I think we jinn are getting smart," Icky went on, sipping his coffee. He looked up with a startled expression. "*This* is *coffee?*"

"That's right."

"Colored water," the jinni decided. "Not at all like the stuff I used to have with old Rog Bacon. As I was saying—or was it Rog Bacon? I forget; it was such a long time ago. As I was saying, I think we're finally getting smart. We used to tool around in silk jackets and pants, speaking very formally. We had to give it up. Have you ever been out in a New England blizzard with silk jackets and shorts on? That gear was strictly for Arabia, man! And when we got formal with humans, they got wary. Seems that anyone who gets real formal with them these days is either out to get something from them or is using

them for something. So we gave up and started studying languages. The old Arabic went out of vogue years ago; these days, we've got to be able to speak local tongue no matter where we are."

"How come you think bop is the local tongue here?" Joe wanted to know.

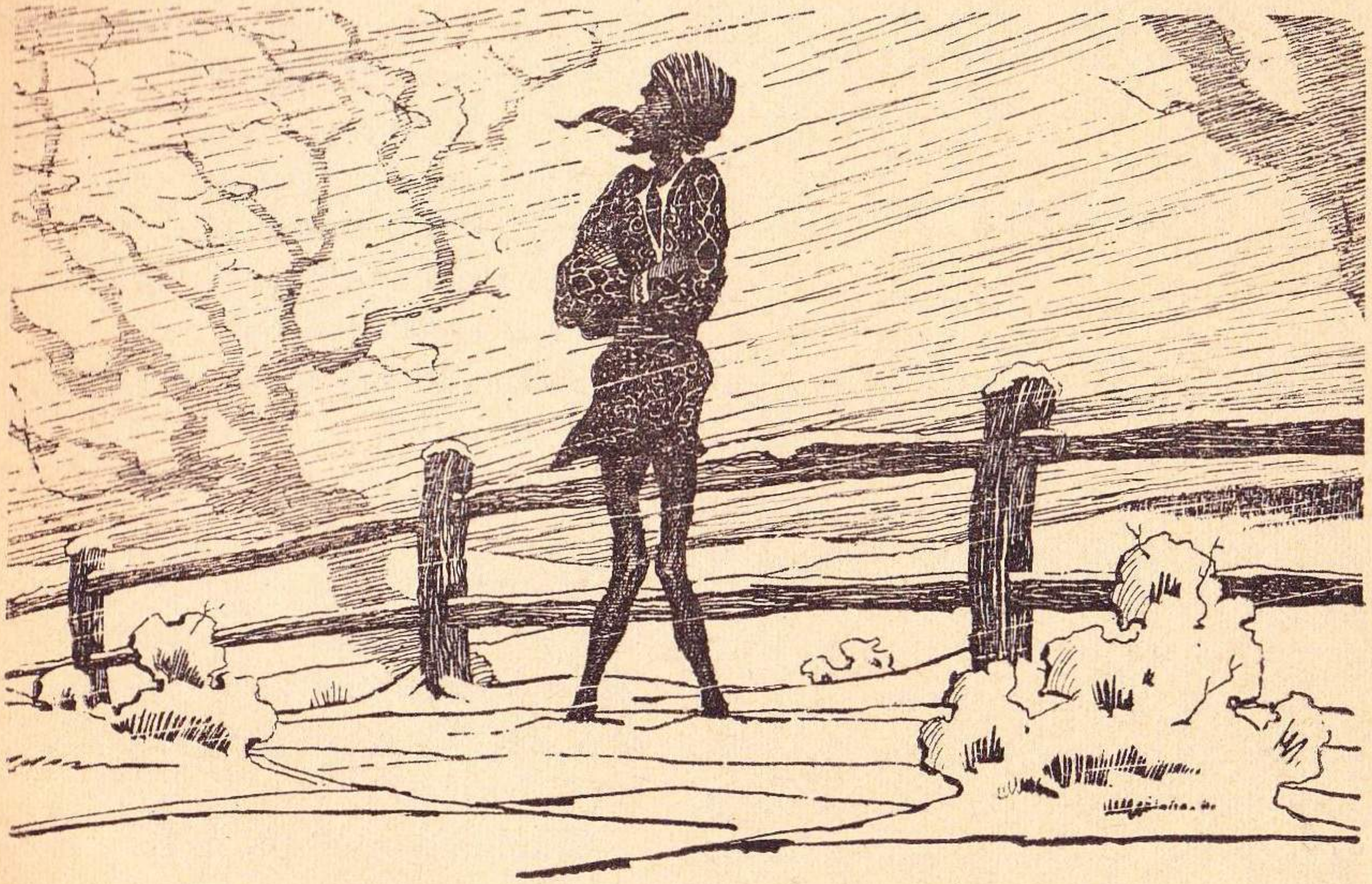
"Well, our only contact with America in the last decade was through Abdulla Ben-Shah. Some character living in Greenwich Village a couple of years back conjured him just for kicks. Seems this guy was a musician by trade. Well, before he got through with Abdul, this guy had him subbing in on alto sax in his combo. That's our latest contact with the English language, so, if it isn't right, you'll just have to try to dig me anyway, man. That's the way Abdul taught me to speak."

"Oh," said Joe, not having anything else of importance to say at the moment.

"And now," Icky said, setting down his coffee cup and getting to his feet, "I guess you'll be wanting me to do something for you. What real cool stunt you have this time, Boss?"

"First off, stop talking that way! It drives me nuts!" Joe told him with irritation.

"I can't," Joe replied casually with that silly grin of his. "All servants come with some sort of eccentricity or other thing you must compromise for—even jinn. I can speak pretty good German or Saxon. How about that?"



"Never mind," Joe sputtered. But he was beginning to like this jinni. The fellow had spunk all right! "I invoked you to give me a hand. I suspect you know alchemy pretty well; I conjured you in that talisman—"

"Cool, man! The sharpest! What do you want, gold from lead? No, come to think of it, Abdul said you'd gotten around to licking that one, too. Well, what is it?"

"I want you to design and build a pressure regulator for me that can't be hexed."

"A snap! Made in the shade!" Then Icky stopped and asked, "Man, what's a regulator?"

"A gadget that takes high-pressure gas and lowers the pressure while maintaining a constant pressure downstream," Joe explained.

"Speak English."

"That's what it does."

"I don't dig you, man. Clean, hex-proof spells are everywhere. No sweat there. You don't need me."

Joe sighed. "But I do. I don't know enough occult science to do the job—"

"I don't know enough physical science to even follow you," Icky snapped back. He stood impassively in the middle of the floor and tried again. "Look, maybe if you can give me some idea of what this crazy gadget looks like and how it works and what it's used in, I might try."

Joe got up and got a piece of paper and a pencil. Then he took Icky into the kitchen and sat down next to him at the kitchen table. As he started to sketch, he remarked, "This device is used in a rocket—"

"Oh! So that's what you want! Fireworks?"

"No, thank you. I had a one hundred thousand dollar fireworks display of my very own just today. That's enough for right now," Joe said bitterly. "The rockets I'm talking about are not fireworks—they're pieces of scientific gear."

"Oh," Icky replied as he watched the engineer draw. "What will you guys think up next? Sundials that work at night, maybe?"

"Got them. They're called clocks."

The jinni looked very discouraged. But he listened—or tried to listen—carefully as Joe explained the workings of the regulator to him. Finally, he said, "I don't dig you. I just don't. The gadget you've got just won't work! How can air be compressed? It's incompressible! So how can you take it under compression and play around with it?"

"We do it every day," Joe sighed, then added, "I guess you're not up on modern theory. The stuff you quoted me was right out of the old, obsolete alchemy books."

"What do you mean, obsolete? It used to work!"

"Not any more. Times have changed."

The jinni didn't reply to this, but took off on another approach. "Just tell me something about this rocket of yours. What are you using rockets for—specifically?"

"Exploration of the upper atmos-

phere as a prelude to the conquest of interplanetary space."

"The Moon and the planets, huh? Why use a rocket, boss? I'll fix it so you can overcome gravity!" So saying, Icky raised himself three feet off his chair and hung in midair.

"Very cute," Joe said sourly. "You'll have to teach me how to do it. But I'm afraid we can't use the method directly for space flight. If I went charging up to *my* boss and hung three feet in the air in front of him, I would be in the booby hatch about ten minutes later. I'm just going to have to stick with the standard method of doing things right at the start here. Later on, I may be able to use some of your tricky methods—but not right now."

"That's the trouble with you humans," Icky pointed out. "Too much in the old groove. Can't get out of the rut. Get an idea, right or wrong, and you will stick to it to your death. No open minds. But, look, man, how about giving with some more of the dope? This sounds interesting even though I don't understand a word of it. But maybe I can learn something. Brief me in on the modern approach to things, will you?"

Joe breathed deeply and settled back in his chair for a long session. Well, it was no good having the jinni around if he couldn't perform with you. Teach him a few things, Joe figured, and he'll be able to connect them with what he does know—and away we go!

By three a.m. the next morning, Joe gave up. And Icky was more thoroughly confused than he had been. "Look, Boss, I can do a lot of things. I can turn animals into men and men into animals. I can produce riches, fine clothes, cook up magical potions, or do your hard physical labor for you. There's only one trouble: you people do all of those things for yourselves now without the help of jinn. I'm outmoded. Obsolete. My knowledge of alchemy is even no good; I couldn't even talk the same language with your nuclear physicists. As for you, I can't even understand what you're talking about half the time. What is hypersonic flow? What is matrix algebra? What is electromagnetic radiation? What do you mean by combustion? What's a molecule? And, man, I don't even have the slightest as to what an electron is!"

"Neither do we," Joe told him, "but we have electronics."

Icky sat back and folded his arms across his chest. He sat quietly for a moment, then remarked, "I think I understand a lot of things now."

"Oh?"

"We're outmoded. We haven't kept pace with the times. Your magic is a lot stronger than ours."

"It isn't magic," Joe told him.

"Isn't it? Our miracles are commonplace beside yours. Our gadgets are out of style; you've got better ones to help you with your magic. Pentacles, magic candles, and talismans are no longer the vogue. The old magicians used to keep their

methods and equipment secret; anybody can get them today if he knows where to look. But your scientific magicians keep their stuff just as secret as the boys of old; just try to get a peek at an atomic bomb! Abdul tried it once because he was a disciple of Democritus. It all goes to prove that black and white magic is through. We're pikers compared to you. You now have other servants, so no wonder us jinn just sat around out yonder wondering why we weren't called any more!"

"You need to be brought up to date, that's all," Joe remarked.

"Man, you said a mouthful," Icky told him morosely, gazing at the floor. "You might as well send me back. I'm no good to you. How can I possibly serve you with what I know?"

"But you have the knowledge of the ages at your fingertips!" Joe complained.

"So I do, but it's slightly behind the times. It needs to be brought up to date."

"Maybe you ought to go to college," Joe said suddenly. Later, he wished he hadn't said it at all.

"What's that?" Icky wanted to know.

"A place where they teach people."

Icky suddenly sat up. "Boss, do you think I might be able to go? I mean, is it just for humans, or can a jinni get in, too?"

"If you got rid of that outlandish outfit," Joe pointed out, "you would pass as a human being. There would be nothing to keep you from doing it."

"Except your permission."

"Eh?"

"I am only here as long as you want to keep me," the jinni reminded him. "Boss, I really want to serve you in any way I can. But I can't until I get some education. Would you keep me around so that I could go to college and then serve you in the way you want?"

"An education costs money," the engineer said.

"One of our talents," Icky said. Again, silver dollars rained from the ceiling. After a bit, they were followed by a gentle snow of five, ten, and twenty-dollar bills. "No sweat there, Boss."

"You also don't get anywhere any more without a background. Birth certificate, social security, draft card—"

"Let me see yours," Icky asked. After he had peered closely at the contents of Joe's wallet, he snapped his fingers and produced a wallet and a file folder full of papers. "I'm legal. Paperwork, bah! Say! Remind me to look into modifying one of our old stunts. You've got a much better system for the elimination of individuals, Boss. Abdul told me all about congressional committees, loyalty investigations, smear campaigns, and brainwashing.

"As a matter of fact," Icky went on, "do you mind if I do something else, too?"

"Speak," Joe snapped.

"The rest of the gang would like to know all about this stuff I learn in college. Can I go back out yonder every so often and brief them in? We've been sitting around on our duffs because we weren't modern; I can change that and bring the jinn back as servants of men again."

"Wouldn't it be quicker if I conjured up some more jinn and gave them the same deal?"

"That's mighty white of you, Boss, but you know as well as I do that a man can conjure and hold only one jinni at a time. But do I have your word that you will let me do this?"

Joe thought briefly. It would certainly be helpful to have the jinn's aid again after all these centuries. It meant that men might be able to make even greater discoveries and advances. For him, it meant that Icky, with his modern knowledge coupled with his present talents, might be able to help him design and build an interplanetary ship.

"O.K.," he answered briefly.

"May I have your permission to go, then? I want to get started as soon as possible," the jinni told him.

After Icky had left, Joe sat by himself and fingered his unshaven face. What a night it had been! And he had paved the way for the jinn to return with their aid for mankind!

"Oh, no!" he suddenly moaned.

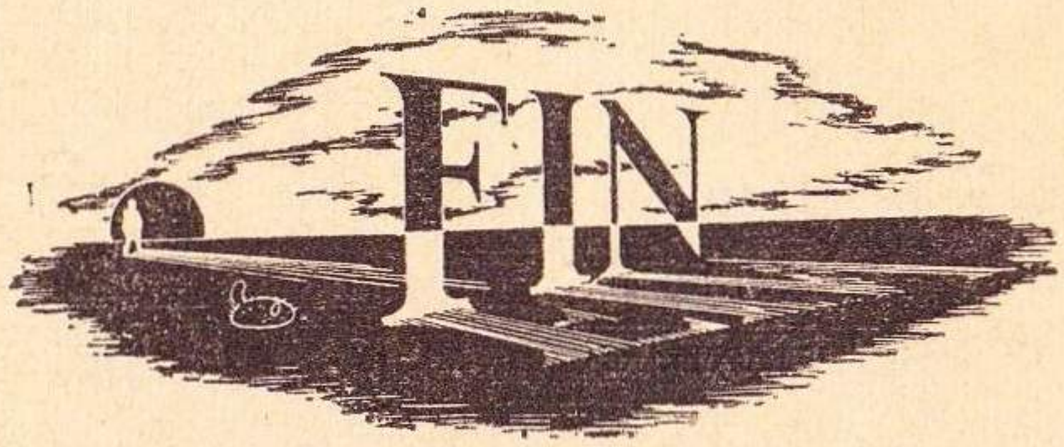
He also realized at that moment that he had loosed magic into the world—real magic! With educated jinn, there would be no limit to what men could do!

The word "impossible" would be deleted from the dictionaries!

Where would men find stability again? What would happen to money when jinn could make as much of it as needed? What would then happen to the large and extremely complex economy of the world? And crime— Well, it would thereafter be a simple matter to commit crime. Freedom would mean something else then; it would be a person's ability through a jinni!

But would it? Would men adapt to it as they had adapted to a world based on physical science?

He didn't know the answer. All Joe could do was to hope for the best. As he sat watching the sun come up, he didn't know. But he had given his word; he would have to stick by it.



THE ANTIPROTON IS FOUND

The inverse of normal matter had been guessed at; to date, the positron, neutrino, and now the antiproton have been found. Anti-mass is still to come!

BY MILTON A. ROTHMAN

The scientist is a man who enjoys symmetry and simplicity. If he can boil a complex group of phenomena down into one simple statement, then he is pleased. The situation in nuclear physics being still very much a chaotic one, it is always exciting when somebody finds some fact or some theory which injects a measure of order into the disorderly accumulation of experimental data.

One of the most disordered domains is the study of elementary particles. In this field we want to know what are the different kinds of particles, what their properties are, and most important, how they interact with each other.

As we all know, there has been an embarrassment of riches with regard to the various kinds of particles. Until recently the better known particles could be classified as in the table below.

In addition there are a number of miscellaneous mesons of various types, together with the hyperons, strange, heavy particles with masses greater than 2000.

A glance at this table shows how nicely symmetrical the lighter particles are. For every negative particle there is a similar one of positive charge. The hole present where there should be a negative particle of mass 1840 stands out

Approximate rest mass.	*Electric charge.*		
	Negative	*Neutral*	*Positive*
0		Neutrino	
1	Electron		Positron
207	mu-meson		mu-meson
273	pi-meson	pi-meson	pi-meson
965	tau-meson	theta-meson	tau-meson
1840		neutron	proton

like a sore thumb. Why this situation?

Why, indeed? For many years people have known that such a particle could exist. They could calculate quite a number of its properties and predict under what conditions such a particle might be seen. The calculations were based upon a crucial question: aside from the difference in mass, is the proton the same kind of particle as the electron?

Here again there is an appeal to simplicity. Since the electron is described by a certain mathematical equation—the Dirac wave equation—it would be very nice if the proton could be described by essentially the same equation.

What does the Dirac equation say about an electron? It is set up to predict how an electron will move about in space under the influence of electromagnetic forces. The very interesting and important result which is deduced from this equation is that there are actually two kinds of electrons: there are electrons with a positive amount of energy, and there are electrons with a negative amount of energy. The first kind are the ones that are commonly known. The second kind on the other hand cannot be observed directly—they are considered to make up an invisible sea of negative-energy electrons all through space.

However, it is possible to give one of these negative-energy electrons enough energy to knock it up into the positive region. Thus an electron has been brought into view, and at the same time a hole has been left down below—a hole which behaves just as though a positively *charged* particle were there, since it represents the absence of a negatively *charged* particle.

This process of pair production is now well-known. When a gamma ray having at least one million electron-volts of energy comes near an atomic nucleus, it is able to give up this energy, producing the electron-positron pair.

WARNING: This description should not be clung to rigidly as giving a "true" picture of what "really" happens down below. It is simply a way of describing in words what the mathematics describes in symbols, and there are other word-pictures which serve the same purpose. It does give a convenient way of visualizing what takes place, and it predicts what happens to a positron once it is formed.

Remember that the positron is nothing more than a hole in the sea of negative-energy electrons. If a positive-energy electron comes along and meets this hole, it can fall in, giving up one Mev of energy in the form of gamma rays. This is the annihilation process—to our instruments it appears as though an electron and a positron meet, both vanishing in a burst of energy. As a result of this, a positron has but a short life when it gets in among a group of electrons.

Now suppose that the Dirac equa-

tion applies to the proton as well as the electron. This would imply the existence of an invisible sea of negative-energy protons all through space. Pair production should now be possible. It should be possible to boost one of these negative-energy protons up into the positive-energy region. This would leave a hole among the protons down below, and just as in the case of the lighter particles, we would see the creation of a pair: a proton and an antiproton. The antiproton is, according to this picture, just a hole in a sea of protons, so that it behaves just like a negatively charged particle with the mass of a proton.

The energy required to create this pair is readily calculated: it is simply the energy corresponding to the mass of two protons according to the equation $E = mc^2$. This comes out to be a bit less than two billion electron volts. In actual practice, however, much more energy is required.

To see why this is, imagine that a proton comes along and strikes a nucleus with barely enough energy to produce a proton-antiproton pair. This means that there is nothing left over for kinetic energy—once the particles are formed they must remain at rest. However, the original proton had a powerful lot of momentum, and this momentum must still be there after the reaction. Therefore you must supply still more energy—two Bev to create the pair, and enough left over to keep the momentum in balance.

Thus it actually takes between 4 and 6 Bev to create an antiproton, depending on the exact process. This figure was kept in mind when the University of California decided to build its Bevatron to reach over 6 Bev.

The experiment which actually produced evidence of the antiproton is a beautiful example of modern techniques in nuclear physics. Yet, in spite of the elaborate array of machinery which was required to perform this feat, the essential features are still the same as they were when the first nuclear scattering experiment was done in 1909.

Three things are required: a source of high speed particles to be scattered, a scattering target, and devices to detect the scattered particles. In the case of the antiproton experiment, the source of particles was the 6 Bev beam of protons from the Bevatron. The target was a small piece of copper. The detectors were scintillation counters of several different types. The entire set-up occupied a space almost the size of a football field.

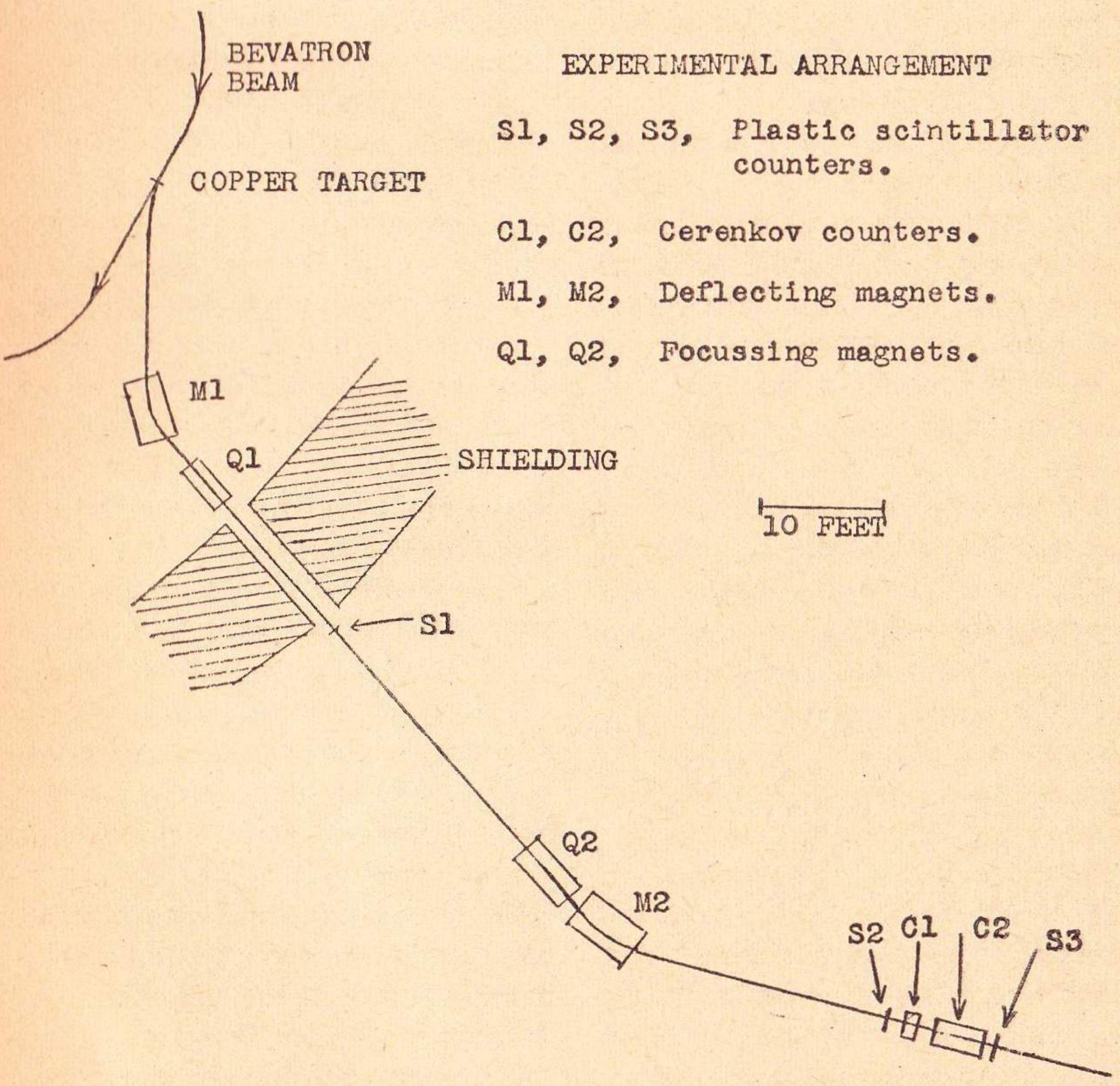
When a beam of protons strikes a chunk of matter, various things can happen. At low energies—a few hundred thousand electron-volts—only elastic scattering occurs. At higher energies, nuclear reactions take place: neutrons and gamma rays are given off. At still higher energies—over a few hundred Mev—mesons begin to be tossed out of the nucleus. Finally—in the region

between 4 and 5 Bev—a few antiprotons begin to be seen. At the same time all the other reactions are going on in various degrees.

The problem faced by the experimenters is the formidable one of detecting and identifying a few antiprotons in the midst of a tremendous torrent of mesons. In the initial experiments, sixty antiprotons were detected and separated from over ten million negative pimesons.

The method of doing this was based on the principle that if you arrange things so that you will get a response from your detectors only if negative particles of a certain momentum *and* of a certain velocity pass through those detectors, then you have the antiproton nailed down.

To accomplish this, an array of two deflecting magnets, two focusing magnets, three scintillation counters, and two Cerenkov counters were used. The scintillation counters in this experiment consist-



ed of plastic cylinders, 2.25 inches in diameter by 0.62 inches thick, mounted on very sensitive photo-electric tubes. The plastic is of a special type which fluoresces upon being struck by radiation. Whenever a high speed charged particle passes through one of these cylinders, a little scintillation of light is produced which is picked up by the phototube and converted into a little pulse of electricity. This can be amplified and counted.

All that a counter like this tells you is that something has gone through it.

The Cerenkov counter is outwardly similar. It consists of a piece of transparent material mounted on a phototube, but it produces its signal by a different method. If quartz is used, for example, the speed of light in the quartz is only about two-thirds of what it is in free space. Therefore if a very fast particle suddenly enters a piece of quartz, it may find itself traveling faster than light does inside the quartz. As a result of this, a charged particle will actually emit light while passing through the quartz, and the interesting thing is that the angle at which the light comes off depends only upon the velocity of the particle.

Although the Cerenkov counter can measure the velocity of the proton, this is not enough, for there may be present many mesons having the same velocity. A measurement of the mass must also be made. Therefore this great line-up of instruments is necessary.

Here is how it was done: The antiprotons, together with a flood of mesons, are formed in the copper target which is located in the proton beam. Emerging from the magnetic field of the Bevatron, they pass through the first deflecting magnet and are focused onto the first scintillation counter. The deflection magnet picks out negative particles having the mass of a proton and having the proper velocity to be deflected through 32° by the particular magnetic field used.

Unfortunately, lighter mesons having a greater velocity could also get through the magnet. Therefore it is necessary to get rid of all particles having the wrong velocity. This is done in three separate ways.

First, the time it takes for a particle to go from the first to the second scintillator is measured electronically. This time is only fifty-one billionths of a second (fitfy-one millimicroseconds), but this is quite a reasonable time to be measured by modern methods. Secondly, the velocity measuring properties of the Cerenkov counters are utilized. Counter C2 is designed to accept only those particles which have a velocity between 0.75 and 0.78 that of the speed of light. This, together with the time-of-flight measurement gives you a good chance of eliminating unwanted mesons. Counter C1 is thrown in on the chance that some faster mesons may still slip

through. This counter picks up any particles traveling faster than 0.79 of the speed of light and gives a signal to ignore these particles.

Thus the initial conglomeration of miscellaneous charged particles has been analyzed down to within an inch of its life, and the gentlemen who operated this scheme—Owen Chamberlain, Emilio Segre, Clyde Wiegand, and Thomas Ypsilantis—were able to pick up sixty of the proper combination of signals which indicated that an antiproton had run the gauntlet of magnets and scintillation counters.

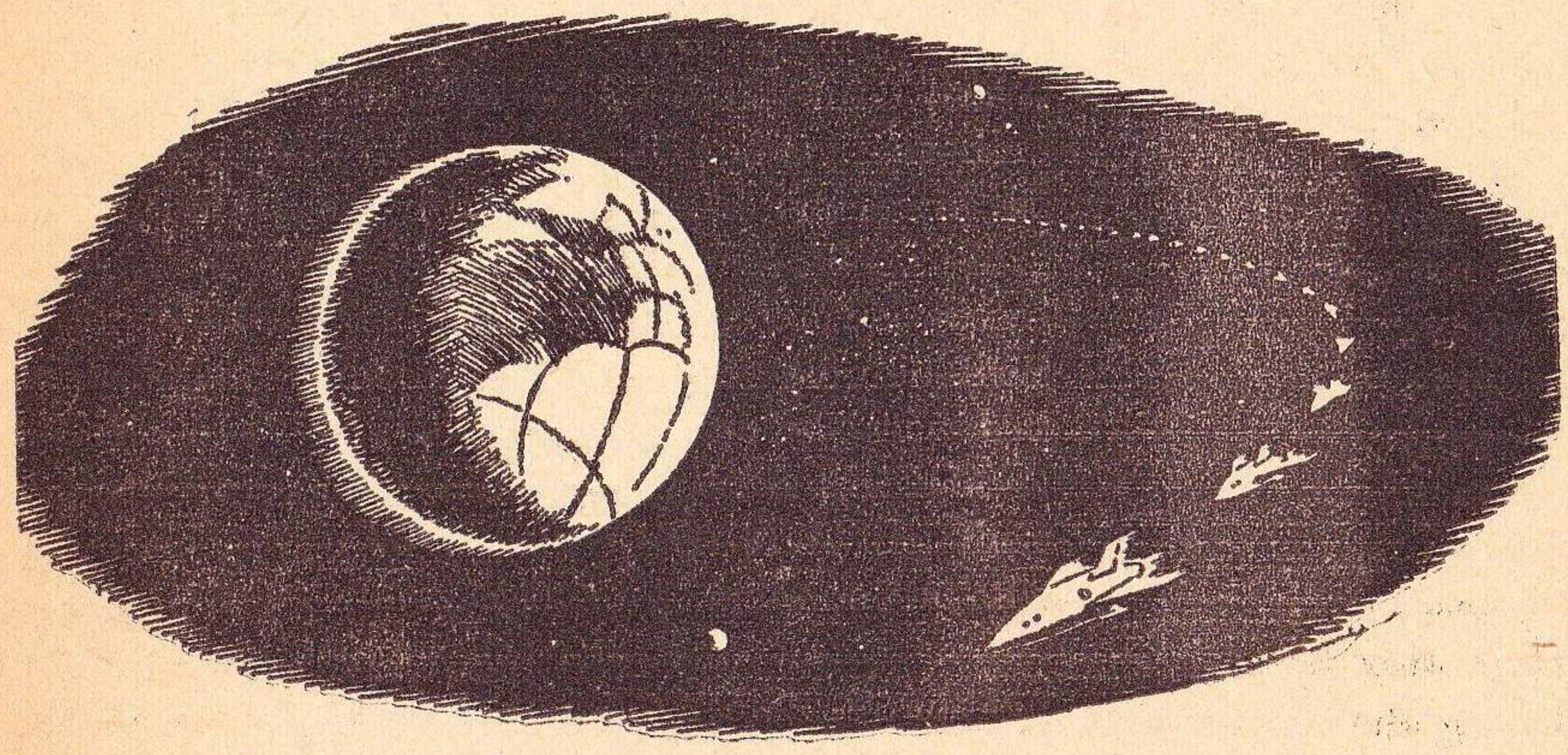
This means a great step forward in the theory of elementary particles. We can now say that the Dirac theory, which was so successful in predicting the existence of the positron, is the same theory that accounts for protons and antiprotons.

Further advances can now be made. People have for the past few years been experimenting with the strange element *positronium,* which consists of an electron going around a positron, and which has an average lifetime of a microsecond or so. Study of this element gives us information about the way in which elementary particles interact with one another.

Now people are beginning to toy with the idea of *nucleonium,* an atom consisting of a proton and an antiproton.

And, of course, we now have a basis for talking about the "contraterrene" matter of science fiction, which presumably would consist of orbital positrons circling a nucleus of antiprotons and antineutrons—a combination utterly unstable in our space, but indistinguishable from ordinary matter in its own space.

THE END



MICRO, MACRO and KING SIZE

This is a strict fact article—and it illustrates, perhaps, that sometimes facts can be very exasperating to obtain.

BY DANIEL WHITTON

As a result of our sudden arrival into the Atomic Era, an enormous amount of research by prewar standards is being done all over the world on the medical, physiological, and biochemical effects of radiation. We are most deeply concerned with ionizing radiation, such as X-rays or gamma rays, which are highly penetrating and cause the rupture of chemical bonds holding together the dynamic molecular fabric of the cell, or which may decompose essential cell components. In carrying out their multi-pronged investigations, researchers are measuring and analyzing every obtainable bit of information they can get on what is happening inside the biological systems. One of the particularly sensitive indicators of radiation damage to mammals is the relative numbers of different kinds of cells in the blood, since the blood-forming tissues are very easily damaged by radiation; the blood itself is relatively resistant.

It has been observed at the University of Rochester's Atomic Energy Project, even in 1949, that people who worked near their 130-inch cyclotron had an abnormally high concentration of lymphocytes with bilobed nuclei (1). In other words, certain amoeba-like blood cells, which are always normally present, had double nuclei. These cells showed up in workers whose exposure to radiation had been well below the accepted "tolerance" levels, and even in dogs which had been placed *outside* the cyclotron building during a ninety-minute run. When news of these observations was passed on through the scientific grapevine, it was also found that

similar observations had been made on some of the scientists at Los Alamos, and on people who painted watch dials with luminous paint. Accordingly, the measurement of bilobed lymphocytes became of great potential interest, as being an exceptionally sensitive biological detecting system for radiation damage.

Shortly thereafter, Dr. W. B. Mason pointed out that in 1923, Herbert Fox had reported an abnormally high incidence of cells with bilobed nuclei in elephant blood (2). It decided therefore, to obtain some fresh blood from an "available" elephant, named Sally, from the Seneca Park Zoo, for further study by the Rochester group. The following paragraphs, exactly as printed in their unclassified report UR-189 (3), tell how they went about solving their problem, and give a fascinating insight into the strange bypaths into which devoted scientists can be led in their zeal for the discovery of truth.

"*Procedure.* On June 27, 1951, the entire hematology group accompanied by R. Hay, M. Tyler, and W. B. Mason, set out for Seneca Park Zoo, equipped with several syringes varying in size from 2 cc. to 30 cc., powdered heparin, solutions of heparin, procaine, needles ranging in size from No. 20 to No. 15, and a generous supply of coverslips and blood pipettes. The literature offered little help regarding the matter of bleeding elephants. An experienced zoo veterinarian, however, had indicated that the ear presented the only large superficial readily available veins.

"*Elephant Handling*: At about 9:30 a.m. the group was escorted into Sally's two-room suite at Seneca Park Zoo. The elephant manifested considerable uneasiness at the approach of strangers.* Mr. Strassle energetically and skilfully maneuvered Sally into position so that she stood relatively quiet. This favorable situation was sustained by Mr. Strassle's feeding the elephant large handfuls of candy at regular intervals, the length of the intervals being largely determined by the speed with which Sally could swallow and reopen her mouth. Once or twice the candy supply ran out at crucial moments. Mr. Strassle saved the situation in these instances by thrusting his empty fist quickly into and out of Sally's mouth, after which Sally would swallow contentedly, *sans* candy. A fresh supply of candy was procured each time before the limits of Sally's gullibility were reached. It is estimated that the elephant ate one half bushel of candy during the entire procedure.

"*Bleeding:* Inspection of Sally revealed that the veins in the ears were indeed large and superficial, and they would have been ideal for venepuncture except that 1) the ears were in constant vigorous motion; 2) Sally seemed to be quite apprehensive about having people even looking at her ears, and 3) the ear veins could have been reached

*This feeling, it should be noted, was mutual.

only with the aid of a ladder. Further inspection suggested that the tail might be a suitable site for obtaining blood, since it was out of Sally's range of vision. Consequently, with one zoo attendant steadying the elephant's tail, 3-4 cc. of 1% procaine was injected subcutaneously about halfway up the appendage. No vein could be felt through the extremely thick, tough skin, and after one or two attempts to aspirate blood into a syringe, the idea of venepuncture was abandoned, and blood was obtained by repeatedly sticking the tail vigorously in the procainized area with a No. 18 needle. Each time, several large drops of blood flowed freely from the puncture site. The freely flowing drops were drawn up into pipettes and discharged a drop at a time onto coverslips for blood smears. Attempts were also made to obtain routine dilutions for red and white blood cell counts and hemoglobin determinations. The blood tended to clot very rapidly, however, and since smears received priority, not all the routine counts were obtained with desirable accuracy.

"The bleeding procedure was complicated only by Sally's attempts to sit down when the needle extended beyond the procainized area. This required critically timed prodding and shouting on the part of the tail attendant, and gave rise to a certain wariness of the entire tail-end crew, but otherwise was not a serious detriment to the experiment."

After having taken the bull by the horns—sorry, wrong metaphor—the Rochester group found that the 1923 report by Fox was in error, due to a misidentification of one kind of blood cell for another kind closely resembling it. Another Frontier of Science was pushed back—with the aid of an Indian elephant, a local anesthetic, and half a bushel of candy, brand unspecified. Fortunately, the investigators did not have to place an order for all these items through the usual official channels. Purchasing agents, especially for atomic energy installations, gradually become rather blasé, but after all, a requisition for one (1) elephant might be considered rather on the bizarre side.

The full story of physiological research on elephants will probably never be told; however, mention should perhaps be made of the classical investigations of Benedict and Lee (4) on the relative merits of various methods for measuring their body temperature. This is, of course, of great practical importance to circus-owners and zoo-keepers who have to keep track of the state of health of their animals. Discussion of their results in this journal would hardly be suitable; however, a recital of their experimental techniques has enlivened many an informal gathering of biologists, and even innocent bystanders. Those wishing to increase their store of miscellaneous information and small-talk for social gatherings are referred to the original paper.

References:

(1). M. Ingram, S. W. Barnes. "Experimental Confirmation of a Previously Reported Unusual Finding in the Blood of Cyclotron Workers." *Science,* 113:32-4 (1951).

(2) Herbert Fox, "Diseases in Captive Wild Mammals and Birds," Lippincott (1923).

(3) *Quarterly Technical Report, (U.S.A.)* 22 (6):405-8 (1936). July 1, 1951-September 30, 1951, The University of Rochester, Atomic Energy Project, H. A. Blair, director, Health and Biology Report UR-189, pp. 8-15 (October 25, 1951).

(4) F. B. Benedict, R. C. Lee. Studies of the Body Temperature of Elephants. *Proc. Nat. Acad. Sci.*

THE END

THE ANALYTICAL LABORATORY

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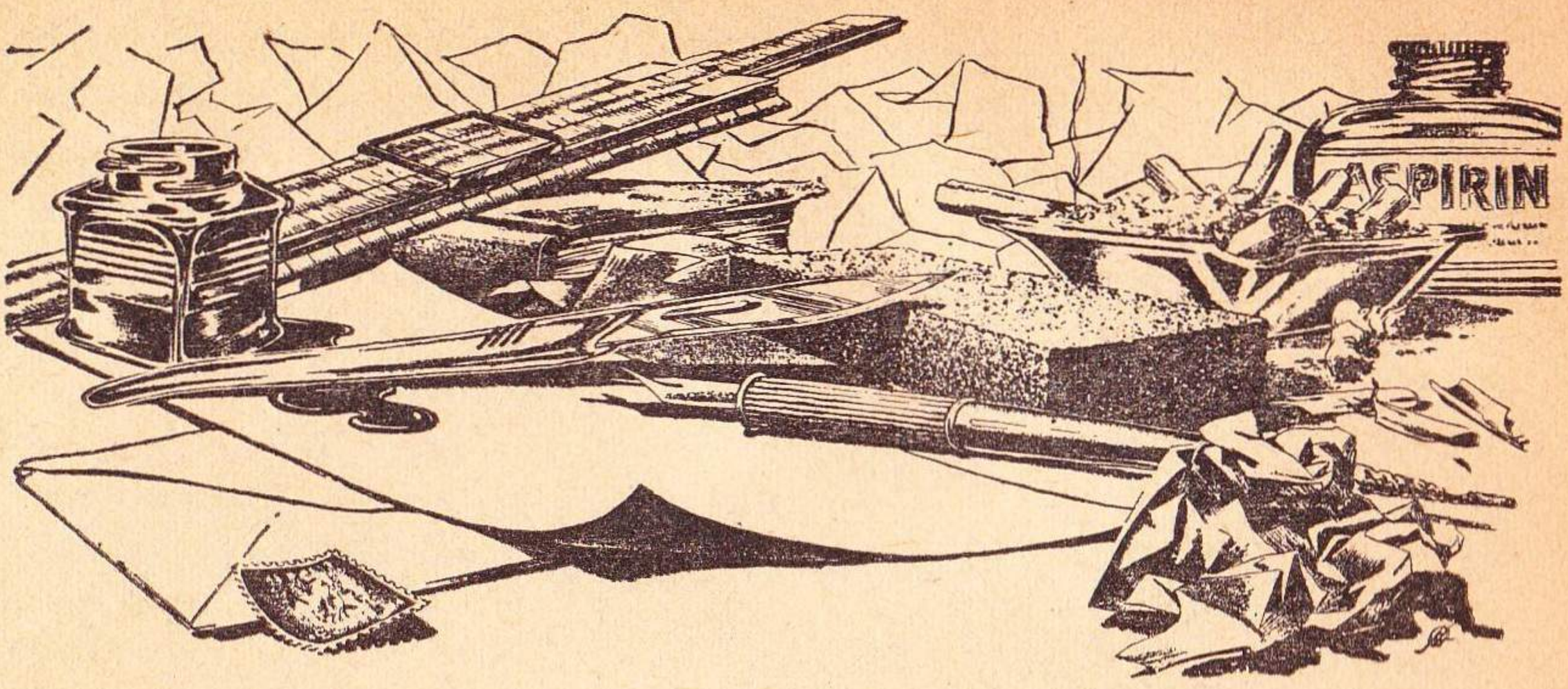
THE EDITOR



BRASS TACKS

Dear Mr. Campbell:

If your editorial, "The Value of Panic," in the August ASF was intended to stimulate discussion, it has certainly worked in my case. This is my first "letter to the editor" ever.

After re-reading your article, I have the distinct impression that your thesis is "let's not legislate against cancer quacks, because they might cure somebody once in a while." Did you seriously intend to give this impression? It seems to me that if you did, you've completely neglected the fundamental argument for allowing only those qualified in the "conventional" techniques to practice the healing art.

Whatever doubtful feelings we may share concerning some of the other practices of the A.M.A., I certainly do not believe that their reasoning in this case is to "deny a man help from another source," where cure by conventional methods is impossible. The obvious—to me—reason why medical authorities are unalterably opposed to "unconventional" faith healers and medical quacks lies in the fact that they are thus preventing needless death and disability, in cases where cures might easily be effected by the "conventional" methods.

Here's another example of a Panic Experiment you might have used in your article: For every one of your incurable John Browns, there are probably hundreds more Joe Smiths, who, afraid of being told that they *might* have cancer by a licensed M.D., and that it *might* be incurable, proceed, with completely illogical panic behavior, to visit your "Dr." Johannus Q. Diddlewiddy, whose office is handy down the street, and who "cured"

Aunt Sarah's "heart disease." If Joe is lucky, and doesn't have cancer, it is likely that he may be "cured" by faith in the Diddlewiddy method —and swear it was worth every dollar. If he does have an early-stage malignancy, he will probably have been delayed by this treatment past the stage where the conventional techniques might have been helpful. Certainly, many more of my Joe Smiths have died needlessly, than have been cured by the Diddlewiddys, or any "laying on of hands" technique.

Your implication that hex doctors are "experimenters sincerely trying a different approach to a problem that medical science hasn't yet solved" is quite misleading. Most of them are, in fact, potential killers. Your example of the doctor who used a mold salve to cure infection seems hardly to be pertinent in this case. Here was no faith healer. He simply had an unconventional treatment which worked, and he didn't know why. Incidentally, I would venture to guess that his license qualified him to evaluate the results of his treatment much more adequately than most ordinary quacks could.

If you would prefer to have treatments given only because they are unorthodox, just consider one example: hard radiation therapy is now being used quite commonly in the treatment of cancer, and with the full approval of "conventional" authorities. Cures effected with "deadly" radiation are certainly unique. The reasons for the success of this therapy are undoubtedly not completely understood. The measure of its success is that it has been shown, to be remarkably effective, even though results may not be reproducible. I would venture to predict that the chances of a successful cure by radiation therapy are undoubtedly considerably higher than those of "Dr." Diddlewiddy's unsterile salt-water injections would be, even combined with his "magic touch."

If yours is an argument for "medical psionics" in the treatment of cancer, I feel that you are on a mighty shaky foundation indeed. Keep up the good work in your series on psi phenomena, but please, please, let's not make this an argument against convention, just for the sake of argument. Let's not underemphasize the tremendous strides which have been made using the "conventional" scientific method with discussions of this type.—Irving Goldberg, 1136 Delaware Street, Berkeley 2, California.

P.S. For your information, I'm not in any way directly connected with the medical profession, orthodox or otherwise. In fact, my University appointment tells me that I am to do fundamental research in the physico-chemical properties of soils and other colloidal materials. We sometimes use rather "unconventional" techniques even in this work. I have seen the "law of laboratory experiment" in operation many times, and have in fact occa-

sionally noticed instances where random or otherwise erratic behavior has resulted in a more informative answer than if the experiment had gone as planned.

Please read the editorial again; I suggested that the AMA give up an inherently futile effort to legislate quacks out of existence, and, instead, arrange some method of aiding patients in distinguishing between the vultures preying on the dying, and the sincere unorthodox experimenters. There's going to be Panic reaction; help it to be useful, instead of trying to end it. The WCTU by legislating against liquor gave us, instead, the worst, most unregulated supply of rotten booze any civilized nation ever suffered from. Currently we have the worst, most unregulated supply of rotten quacks any civilized nation ever suffered from. You like it the way it is?

Dear Mr. Asimov:

Just in case that goose is still alive and laying eggs, I have a suggestion to get viable eggs. Put the goose in an environment free of 0-18 and other convertible isotopes. Of course, the goose may have adapted to the auremoglobin so that it can't exist without it, but it's worth trying, anyhow.—Bob Ross, 69 Tiemann Place, New York 27, New York.

Sounds like a valid suggestion!

To: The Department of the Golden Goose:

That Texas gang I guess hasn't gotten together with the Argonne Laboratories group; they'd better. Argonne has, for some time, been working on biological processes using radioactives; they're growing plants in special radioactive-CO_2 atmospheres, et cetera.

Better rush that goose up to Argonne, and put it, together with a suitable gander, in one of Argonne's sealed herbariums. Luckily, geese are herbivorous. May take a few months of patience, but you'll get your goslings in due course.

In a sealed system wherein one, and only one component undergoes an irreversible reaction, precipitating it from the system, that component will be eliminated from the system.

Since The Goose converts 0-18 to gold with an unknown efficiency, in a sealed environment, The Goose will, herself, eliminate all 0-18, down to the concentration which her nuclear metabolism can no longer affect.

The gold-producing reaction will then cease by exhaustion of input. If she is not a sterile mutant, the gold-poisoning having been eliminated, she will lay fertile eggs.

The problem as presented did not suggest that the gold was necessary in any way to The Goose's metabolism, but specified it was toxic, and was being eliminated by excretion in egg-shell.

Isotope separation by normal technical means would be possible, but darned expensive, and we have no data as to what degree of isotope separation would be needed; The Goose's own metabolism would, in a sealed environment, supply all the necessary data, as well as supplying the required elimination of 0-18. The only input required to the sealed system would be light energy to allow growth of the plants on which the sealed-in geese live.

I'm sure any of the Argonne biochemists could have supplied this information, if you'd checked with them! I think your research team earned one of those goose eggs, non-productive type.—James Stagg, Chicago, Ill.

Solution neat and complete!

Dear Sir:

Although I have been reading Astounding since before the demise of *Unknown,* I have never before been stimulated to write to you. The occasion is the Special Feature, "Pate de Foie Gras," in the September issue.

Being a biochemist cum physiologist myself, I immediately saw at least three different avenues of research which seemed profitable, only one of these, however stood my own scrutiny. It follows herewith:

As most of your readers should know, it is a relatively simple task to set up culture flasks with more or less controlled environments, generally composed of chick embryo extract, homologöus—in this case Golden Goose—serum, and perhaps an admixture of vitamins or amino acids. In such a medium cells from living organisms, when implanted find a home, and proceed to go about their business, which is no more than organizing their environment to make more cells. A biopsy of the liver will yield enough cells to start with, and from there on, as Carell and Lindbergh demonstrated, only patience and money are required. Certainly the latter is available to the AEC, the Department of Agriculture, and to, unless I miss my guess, the purported author.

My own experience with Tissue Culture is negligible: I worked under Dr. Douglas Humm, who solved the much harder problem of keeping a fish embryo alive outside of its mother. (Live bearing poeciilid fishes, of course). With the micromethods already available to the biologist, only a few flasks would be needed to provide enough tissues for beginning metabolic studies. If by chance the Goose dies, enough tissue would be readily available to start a whole series of studies.

Incidentally it would not be difficult to set up a colony of geese in an environment like that producing the favored mutation, on a large scale; and who knows, the flock of

Anser auriciova would be no rarity.
—Martin Roeder, Ph.D.

Why raise a whole goose when a liver will do?

Dear Mr. Campbell:

I enjoyed Isaac Asimov's parody of "The Goose That Laid the Golden Eggs" in the September issue. Perhaps I should call it a parody of a research thesis in Biochemistry, because it was full of fun for the scientist who is able to laugh at a travesty on his own serious, precise ways.

The problem—how to reproduce the goose—is not difficult. All the needed clues are supplied. Remove the gold so that the eggs are not killed by heavy-metal poisoning, and they will hatch—provided, of course, that a gander is run with the goose.

The key to the problem is on page 114, where it is stated that, by enriching The Goose's intake of 0^{18} for a week, gold production per day rose from 38.9 to 45.8 grams. 0^{18} is seen to be both fuel and raw material for the oxygen to iron to gold transition. No mention is made of the reverse experiment, and we assume that it was not performed—but there lies the solution. Keep The Goose for a few weeks on water, air, and feed from which the 0^{18} has been removed, and the gold output will gradually taper off as the liver and other tissues are cleared of the element.

Fifty per cent of the female offspring of The Goose should be golden-egg-layers, since the mutation —having appeared in the F_1 generation after the radioactive fall-out is probably a dominant. It may, however, be a sex-linked recessive, in which case it will not appear in the F_1, but will appear in fifty per cent of the daughters of the sons of The Goose, as shown below. (If, however, the mutation is sex-linked and dominant, we are licked. It would be lethal to the F_1 males—they would accumulate gold in the liver, and have no ovaries through which to excrete it!)

Parents:—g↑ g↑ ♂ X g—♀ (*The Goose*)
F_1:—g↑ g ♂♂ & g↑—♀♀ (males heterozygous, females lack the trait.)
F_2:—g↑ g↑ ♂♂; g g↑ ♂♂;
—g↑ — ♀♀; g— ♀♀ (This last group the enchanted geese.)

—John Erickson, Box 591, McCook, Nebraska.

We are not licked! Keep the F_1 males in the 0-18 free environment and they'll be all right!

Further, males normally transmit female-sex-linked characteristics they themselves don't display. Men father daughters showing figure traits characteristic of the father's ancestral line, for instance.

THE REFERENCE LIBRARY

BY P. SCHUYLER MILLER

UFO "SNAFU"

One of the articles of faith of the real gone flying saucer enthusiasts is that the government is conspiring to keep reports of new sightings from reaching the public, and to hide the "truth" about what has already been seen. Every book repeats the classic cases from the writer's own personal point of prejudice, inserting or selecting the things he thinks the Air Force is "hiding." The assumption is usually that if the facts were let out, the writer's pet ideas—little green men, little black men with fur, beautiful women from behind the Moon, Shaverian occultisms, or creatures from Zilch III—would be triumphantly demonstrated. You'll find this attitude documented in at least four of the host of flying-saucer books which have appeared in the last several months: Donald E. Keyhoe's "The Flying Saucer Conspiracy" (Holt, $3.50), Aimé Michel's "The Truth About Flying Saucers" (Criterion Books, $3.95), M. K. Jessup's first "UFO Annual" (Citadel Press, $4.95), and Edward J. Ruppelt's "The Report on Unidentified Flying Objects" (Doubleday, $4.50).

The disturbing part about Rup-

pelt's book is that he makes clear that such a "conspiracy" did and probably does exist in government circles, although for rather different reasons than Donald Keyhoe and the other writers listed or omitted here —there are dozens more of these that I haven't seen—would have you believe.

Edward J. Ruppelt was head of the United States Air Force "Project Blue Book" from 1951 to 1953. As such, he is the first writer on Unidentified Flying Objects (UFOs) who has had access to all the government files on sightings, and who has himself conducted Air Force investigations to find out what was seen. If you want to read one flying-saucer book, I'd say this is the one, although it will neither dispose of them all as natural phenomena nor reveal that they are spaceships. It will make clear that there have been a large number of "good" sightings by reliable witnesses which nobody has been able to explain away.

It will also make clear the typically bureaucratic—or military-bureaucratic—snafu through which, when Major Ruppelt arrived in Washington at the very time of the widely publicized visual and radar sightings, he had to learn about them through newspaper reports (no information had been sent to him at Dayton); he was not permitted to use a staff car to get to the National Airport (senior colonels and general only: hire a cab—at your own expense!); and he was told by the Pentagon Finance Office that if he didn't get back to Dayton—fast—he'd be AWOL.

This was a matter of the "Project Grudge" attitude which was official in and around the Pentagon, and apparently is again public policy where UFOs are concerned. The Air Force had started out with an open mind, to find out, if it could, what was going on. Project Sign collected and studied all kinds of data, made it pretty evident that the Maury Island episode with its chunks of "mystery metal" was a rank hoax, and accomplished a great deal of good work. Its active people had a definite point of view: flying saucers were *something,* though they didn't know what. This faction stuck its neck out in 1947, when the Air Force said publicly that saucers were real . . . but then the top brass wanted a quick answer: "real what?" And the answer wasn't forthcoming.

The immediate result was that the Pentagon level of the Air Force began to lose face with the other services, with the politicians, and with the public. This was, obviously, because they were really involved in a political investigation rather than a scientific one. If UFOs were real, there had to be a quick, simple answer like "Russian rockets," or "ships from Mars." And when the answers didn't come, Project Sign was converted into Project Grudge on February 11, 1949, with a new philosophy: UFOs don't exist.

To quote Ruppelt: "In no time they found that this was easier to prove and it got recognition. Before

if an especially interesting UFO report came in and the Pentagon wanted an answer, all they'd get was an 'It could be real but we can't prove it.' Now such a request got a quick, snappy 'It was a balloon,' and feathers were stuck in caps from ATIC up to the Pentagon. Everybody felt fine." And what Ruppelt calls the "Dark Ages" of saucer investigation began, piling justification on the suspicions of the most paranoid and wild-eyed of the saucerians.

By the time Ruppelt was assigned to the investigation, this "Get rid of 'em" attitude had filtered down through military channels to the point where pilots and everyone else wearing a uniform knew that they were not supposed to report sightings, no matter what the order on the bulletin board said. Or if someone turned in a report, it was to be filed—in the nearest circular file. Or if the local colonel was a stickler, in the dustiest file cabinet. That approach lasted for years and is still in force.

Like all saucer books, Ruppelt's consists largely of detailed accounts of various sightings, some explained away as balloons or birds or other phenomena, some left unexplained. It is especially interesting to see his judgment, from the full evidence, on some of the "classic" cases which other writers are still using to "prove" just about anything. The very early Maury Island hoax I have mentioned. More important is the death of Captain Mantell in January, 1948. In the "orthodox" books, Captain Mantell chased a saucer over Kentucky until it turned on him, "disintegrated" his F-51, and of course, killed him. He is claimed to have said, to the tower, "It looks metallic and it's tremendous in size . . ." Re-investigating, Ruppelt concluded that Mantell's "saucer" wasn't Venus or a sundog. He found that neither the ship nor Mantell's body had "disintegrated" or burned: the ship *had* lost a wing when it crashed. The wreck was not radioactive nor magnetized. But the report did turn up a nearby astronomer who had turned his telescope on a UFO and discovered it to be a balloon, and although there are no records to show whether the Air Force did or did not have a Skyhook balloon in the air at the time, this stands as a good possibility. At least, nobody can recall who heard the "It's metallic and tremendous" statement.

Exasperatingly, Ruppelt says that a simple explanation was found for the Lubbock lights, seen by an imposing collection of scientists, but that he can't reveal the answer. More grist for the sensationalists. The Florida scoutmaster who was alleged to have been rayed by a saucer was probably staging an elaborate hoax . . . but if so, he found a way of scorching the grass *from the roots up* without harming the blades. As for the two movies which supposedly reveal all, the Great Falls, Montana film shows two large circular lights, without detail, crossing the sky in a hurry. Verdict, an unknown. The

Tremonton, Utah, movie is in the same category: we dunno. And so are many other cases.

Taken, now, with the seasoning of Ruppelt's inside account of Air Force "wish 'em away" tactics, Keyhoe's new book gains a certain weight. He seems to be honest about the facts he uses, although he doesn't always use or have all of them, and although —as Ruppelt emphasizes—his interpretations are strictly his own. He still insists that Mantell's plane "disintegrated" and he speaks of "thousands of verified sightings" by Air Force and other official personnel. On that, at least, Ruppelt had some figures: from June 1947 to January 1953, ATIC—Air Technical Intelligence Center at Wright-Patterson Air Force Base, Dayton, Ohio—received about 4,400 UFO reports but immediately rejected all but 1,593, apparently as unanalyzable. Known, probable and possible balloon sightings accounted for 18.51% of these roughly 1,600 (technically "thousands"). Aircraft (same categories) were good for 11.76%; astronomical bodies for 14.20%; hoaxes, 1.66%; searchlights, birds, blowing paper, inversions, reflections, et cetera, 4.21%. Reports where investigation failed to turn up enough evidence for any kind of evaluation added 22.72% to those originally scrapped. Unknowns: 26.94%. And Lloyd Mallan, in his "Secrets of Space Flight," further broke this down to Good Unknowns: 12.

My chief quarrel with Keyhoe as a writer, aside from his uncritical approach, is his obvious lack of scientific background when dealing with a scientific subject. This seems to leave him open to any wild "explanation" as having equal weight with the established laws of physics and mechanics. I cited some real howlers in his last book; this is a little better, but there are a few nice ones. For example, he speaks of the Mare Crisium on the Moon as a crater which can have a bridge across it, when actually it is a huge plain covering some 66,000 square miles. He says, Page 264, that Mount Palomar astronomers made "a spectrographic analysis" of the alleged bridge which "proved it was constructed of metal." This is ridiculous.

So are some others: that a planet cannot capture satellites (p. 103); that Phobos' orbit is "apparently not in accord with the natural laws of the universe" (p. 124); that Martian clouds can't be seen from the Earth (p. 127); that the growth of Martian vegetation is stopped by mysterious rays during the occasional "blue clearings" (p. 126). A Darby, Pennsylvania, fire marshal becomes an expert metallurgist and declares that the material of a fireball is "some metal unknown on Earth." And so it goes . . .

Let's hurry on. From Aimé Michel, "the eminent French mathematician and engineer," we get another summary book which accepts the garbled secondary accounts of the Mantell incident, adds a number of European sightings which haven't

been in the American books—and in passing reveals that one "man from a saucer" in Scandinavia was a lost American helicopter pilot—and uses a good deal of his book on the theory of propulsion advanced by one Lieutenant Plantier, in which saucers tap a field of cosmic energy found throughout space. The manipulation of this field, supposedly, would reproduce the phenomena of high speed, luminescence, terrific accelerations, et cetera typical of "saucers," since (as with antigravity—an explanation credited to Hermann Oberth by Keyhoe) the crew would be influenced equally with the ship. I can't quite follow the reasoning from the snatches given, but the book as a whole is less wild-eyed than most.

Finally, M. K. Jessup, who is also an Atlantean enthusiast and wide open to occultist explanations of saucers, has compiled the first of a series of UFO annuals which purport to bring together all significant UFO reports of the year (1955). Hairy black dwarfs out of Latin American saucers, little green men in Kentucky, and a mysterious masked visitor to the State Department, who dropped a coin from another world, are reported as soberly as fish from the skies, dying warblers, and ordinary things in the air.

Ruppelt's book, brought into the saucer literature at this point, accomplishes several things. It puts, or should put, an end to other writers' wild statements about what the Air Force did or did not learn about some sightings. It makes very clear how scanty and conflicting the evidence usually is in such cases, and the amount of time and expense involved in finding out what did happen. And by so doing, it makes the garbled, hearsay "evidence" of most of the other books just about worthless.

Me—I still want to see a flying saucer. I also want to see a ghost. Anyone willing to help out?

THE HUMAN ANGLE, by William Tenn. Ballantine Books, New York. 1956. 152 pp. $2.00; paper 35¢

"Wry and ingenious" seem about the best adjectives to use for this collection of eight recent short stories —mostly 1954 and 1955—by a craftsman in tricky angles. The title story, by the way, is the oldest—1948—and the only fantasy: a neat little vampire tale.

The other seven stories are of varying lengths, from *Galaxy* and *Fantastic Universe*. In most cases there is a snapper at the end, but the story by no means depends on it for interest.

We open with "Project Hush," in which the first expedition to the Moon finds a space-hut already there. In "The Discovery of Morniel Mathaway," an art critic from the far future comes back to meet the abstract artist who is considered the greatest painter in human history:

I think it's my favorite of the lot. An unresolved mystery that leaves you more flabbergasted than you start is "Wednesday's Child," the story of the girl with no navel, who keeps growing new teeth and having her appendix out. And the most serious and ambitious is "The Servant Problem," a picture of a future society whose dictator, the "Servant of All," assures himself that he has at last attained the day of complete control over the lives and reactions of humanity. Here the ending is wriest of all.

My other favorite is "Party of the Two Parts," which deals with the headaches of a galactic administrator when an amoebic crook from Gtet sells some Gtetan pornography to a Chicago school teacher, and a legalistic battle of the eons promptly gets under way. "The Flat Eyed Monster," as you might suspect, is an inversion of the honored bug-eyed-monster formula: a professor is snaked away by teleportation to a world of telepathic, multi-eyed suitcases and tries to escape before they destroy him as a monster on the loose. And "Man of Family," the closer, is a rather routine sociological variant about the commuter whose job demotion means that he must get rid of one of his children, since child-status is the gauge of success in his time.

I don't think any of these will become great classics, but I've enjoyed reading them and I'm sure you will.

OVERLORDS FROM SPACE, by Joseph E. Kelleam.

THE MAN WHO MASTERED TIME, by Ray Cummings. Ace Books, New York. 1956. 146 + 172 pp. 35¢

The Kelleam half of this Ace Double Novel seems to be an original; at least, no previous publication is listed. At any rate, it's a standard Earth-slave-defeats-the-Alien-Overlords yarn with no particular saving graces. This time the scientific Underground is holed up in a left-over space satellite.

The Cummings half is, I hope, the beginning of a reprint comeback for this underrated master of the formative years of SF. (Ace, you'll recall, also published his "Girl in the Golden Atom.") Formula-written, and in the later years plagued with a peculiar style to which many readers objected—I am not one of them—the Cummings yarns were as eagerly awaited in *All-Story* and the other Munsey magazines as were the latest "Tarzan" epics. My own first SF, other than Verne—and "Tom Swift"—was Cummings' utterly fantastic "Man On the Meteor" in *Science and Invention,* where Hugo Gernsback was working up to *Amazing*. I had a quarter to squander, and bought the magazine with the Martian on the cover instead of eating lunch. Of the great names of that era, only Murray Leinster is still going—and keeping pace with the field.

"The Man Who Mastered Time" ran in *Argosy* in 1924. It is a sequel to "The Girl in the Golden Atom," and like that book is part of Cummings' early "Matter, Space and Time" trilogy. The third corner of the triangle was his first interplanetary yarn, "The Fire People," laid on Mercury. And as far as I know, this was the first "big" time-travel story since Wells. I think the author—for five years Edison's secretary, and now, at nearly seventy, a resident of Mount Vernon, New York—has done a little up-dating in the scientific jargon. At any rate, the story shows its age very little.

Loto Rogers, the hero, is the son of the "Chemist" of Ray Cummings' first book and Lylda, the girl he brought back out of the golden atom. Like his father before him, Loto sees a girl—in the far future, however, rather than the infinitely small—through a gadget he has invented, and sets out to rescue her from the villain. He soon finds himself in another glacial era, twenty-eight thousand years in the future, in a typical autocratic SF society in which the effete rulers are in for an uprising of the commoners and a simultaneous attack by outlaws from the cold lands. The scientists are trying to maintain the balance, and Loto sends for help via time machine. There's a big battle, a kidnaping, a chase . . . everything that has since become standard in much of SF. The big scenes are well visualized (it has always seemed that Hollywood should do well with Cummings—if they could afford the effects), and in the evolved dogs-of-burden we have one of the touches which used to lend a special quality to the Cummings tales.

With Ray Cummings, you were always pretty sure what was going to happen, but you never knew how. Isn't that pretty much the truth of any mass-entertainment medium, from the women's magazines to TV?

THE GREEN QUEEN, by Margaret St. Clair.

3 THOUSAND YEARS, by Thomas Calvert McClary. Ace Books, New York. 1956. 190 + 128 pp. 35¢

To dispose of the reprint half of this Ace Double first, the original of the McClary book goes back to this magazine in 1938, and the Fantasy Press edition was out in 1954. Scientist Simon Gamble, in the course of a power feud with Tycoon Vincent Drega, puts mankind to sleep for three thousand years. Then those who have survived try to rebuild society. It's crude, in a way, but oddly effective—principally because neither Gamble nor Drega is all bad or all good, and their reactions are almost convincing.

The new half of the book, from last year's *Other Worlds*—where it was "Mistress of Viridis"—is another of the no longer very novel van Vogtian plots, in which one set of plotters are undermined by another set of plotters while a third set works at right angles to them both, and nobody really knows what

is going on or who is making what happen. This time, on the repulsively caste-organized colonial world, Viridis—why anyone should ever have settled there is a mystery to me—two sets of schemers are at work turning a local beauty into the personification of a mythical "Green Queen" who will one day bring justice and plenty to the world. It's rather dull, really, except for a brief flash of imagination near the end where the real nature of the Queen's search is revealed.

JOURNEY TO THE CENTER OF THE EARTH, by Jules Verne. Ace Books, New York. 1956. 256 pp. 35¢

From time to time someone suggests that I review one of the old classics of science fiction, just to make clear to newer readers what they're all about. I can probably do it legitimately now, because one after another of them are coming out in paper-back editions. Since many of these books are rather old, more than a mere notice may be in order.

This Ace edition of Verne's best—to me—SF novel has the added advantage of a new translation by Willis T. Bradley, which means that the English doesn't sound like 1864. The book was Verne's second, following his first "Voyage Extraordinaire," the "Five Weeks in a Balloon." Scientifically, there are many ways in which the book won't hold water: the increase in air pressure is simply ignored, and the grand finale in which our intrepid travelers on their raft of fossil logs are spewed out of the crater of an erupting volcano is pure TV. But—in spite of what some commentators have said—Verne does *not* fall into the trap that Burroughs did, of putting his inhabited subterranean world on the inner surface of a hollow sphere. The ghastly sea, the fungus forests, the dinosaurs, the mastodon herd with its giant subhuman herdsman—all these are in a vast bubble or hollow in the rock, since Verne knew very well that in a hollow globe the gravitational attraction is toward the center, *away* from the surface.

As to the plot, Professor Otto Lidenbrock, mineralogist and book collector, discovers a cryptogram in which an Icelandic scholar reports that he has descended to the center of the Earth through the crater of Sneffels, a volcano near Reykjavik. The Professor, his nephew, and a guide follow suit. They are lost, they run out of water, they rejoice in watching the geological strata pass, and finally they emerge into the phosphorescently lit inner world with perhaps the greatest assemblage of wonders that Verne ever put into one book. He never dared go quite this far from the textbooks again.

EXPLORING MARS, by Roy A. Gallant. Garden City Books, N. Y. 1956. 62 pp. Ill. $2.00

This is a book for children, and Lowell Hess' color illustrations aren't

Bonestell or even Coggins, but the combination is a companion to the same team's "Exploring the Moon" of last year, and well worth your time. For one thing, you get a color adaptation of Antoniadi's map of Mars, which as far as I know is the only thing of its kind in print . . . plus a set of four paintings showing the sweep of the seasons over the Syrtis Major hemisphere . . . plus another set of maps showing changes in various areographic details. The text very competently covers the current ideas as to the formation of the planets, summarizes the history of Martian studies, and gives a down-to-earth resumé of what the planet is probably like and why. Give it to any space-minded youngster under twelve and see to it that the older kids know it's there. The author writes astronomical articles for *Boys Life*, the Boy Scout magazine, and seems to have aimed at the younger scouts who aren't affronted by the picture-book approach.

A man who writes books himself, and who has many book-writing friends, has trouble trusting any textbook. He knows that he himself makes mistakes, that all his friends are humanly fallible —and has, understandably, some difficulty accepting "I read it in this book!" as "proof" of anything. The more of the bibliography you yourself have created . . . the less you trust bibliographies.

(*Continued from page* 5)

December 21st, at 45° North, the landscape will record as black.

Now if we're interested in learning what can and cannot be done with this particular tool of observation, it is essential that we make an accurate analysis of what this device will abstract from the Universe-of-reality around it. It'll save a lot of lost time, film, and patience; there's simply no use whatever trying to take indoor pictures with artificial light sources of the ordinary incandescent bulb type with this observer. We'll have to use a high-intensity flash, or waste film and effort.

Einstein's work was precisely of that order; he made a magnificently accurate statement of the possible and impossible within *the limits of the One-Eyed Logician's observations.*

His observer, like our box-camera observer, is strictly limited by his techniques. The result will be that the Universe-as-he-sees-it will be strictly and positively limited. You can put it down as an absolute impossibility that you cannot, and never, never will be able to use an F 11 lens box camera, with a Speed 20 blue-sensitive film and a fixed 1/25th second exposure to take indoor night pictures with standard tungsten room lighting.

For that you need an F 2.8 lens, Tri-X Panchromatic film, with a speed of 200, and an exposure of 1/15th second. Then of course you get some very nice pictures.

But neither now, nor in all time to come, will it ever be possible to take indoor night pictures with an observer of the type defined above. Sure—given a film with a speed of 4000 or so, the box camera can do it. But that's not the observer we discussed; the observer's been altered. And yes—if you put enough photoflood blubs around, till you build up the light intensity to about five times normal sunlight, you'll get good pictures. (The excess is to make up for the lack of blue in tungsten light—critical with our blue-sensitive-only film.) But that's not the defined situation.

In discussing the Universe-of-reality, it's important always to remember that we never do more than observe by a certain limited system of techniques. You can't both determine the position of an electron, and determine its velocity, as Heisenberg pointed out. But that's only true *provided* you are limited to electromagnetic observational techniques. A precisely comparable problem exists for a blind man who is trying to read the indication of a micrometer; he is forced to use mechanical techniques of observation—i.e., he has to feel the indicator tactilely. Since a micrometer is necessarily operating on extremely small mechanical forces, the least mechanical pressure the blind man can detect is approximately equal to the force he's seeking to measure. Our No-Eyed Logical Observer, in this case, is forced

to conclude that it is impossible to determine accurately forces of this order of magnitude.

The One-Eyed Observer can, of course, use electromagnetic techniques for determining the position of the micrometer needle, instead of mechanical techniques, and has no trouble at all measuring such small forces.

Einstein did *not* describe the real Universe; he never kidded himself that he was. Many of his followers, however, have not shown the wisdom of Einstein, and have said "the Universe *is* this way—"

It matters not a whit that we don't have techniques other than mechanical or electromagnetic available at the moment; what is important is to recognize that Einstein's Relativity theories *do not apply to the real Universe.* They apply solely to our maps of the reality. On a Mercator Projection map of the Earth, the shortest route between two points in the middle areas of the map can be determined by laying a straight-edge between the points. A very handy feature for early navigators—but it's no help at all to a radio ham, for example, or an aerial navigator. The shortest route between New York City and Calcutta can't be shown on a Mercator map; it lies directly across the North Pole. A New York radio amateur, pointing his beam antenna at Java, may find Finnish and Swedish stations interfering with him; they lie in the same shortest-route direction.

The semanticists say "The map is not the Territory"; it's necessary to recognize that the importance of that statement lies in the fact that sometimes the map does *not* map the territory in the desired respects. It's inherently impossible to show a trans-polar route on any Mercator map; since early navigators were totally uninterested in trans-polar routes, the Mercator Projection's inherent gross inadequacy was of no useful importance.

If Einstein's Relativity Theories are taken as being *descriptions of reality,* instead as being what they are—descriptions of the *appearance reality will present to a One-Eyed Logical Observer*—the consequent conclusion is that *there is no use*

seeking further techniques of observation.

Inorganic matter displays the characteristic that what it can do, it must. Any non-living system always does everything it can do.

Living systems don't display that characteristic; if a living organism can do something, it—*may*. There are many things that I *can* do, but do not want to do and so don't. Naturally, there are things I want to do that I can't do. For a living organism, *can* is necessary, but not sufficient. For an inorganic system, *can* is both necessary and completely sufficient to determine action.

Because desire as well as ability must be present in order for a living system to act—consider the effect of blocking desire. If you do not *want* to try an experiment, the fact that you *can* has no meaning—you won't.

So long as the proposition that Relativity defines the Universe-of-reality is accepted—*you can't want to find new techniques*. You can't want to invest the time, effort, and equipment in new approaches. The fact that you *could* do so then has no meaning whatever, so far as determining action in that respect.

Let me suggest one problem for consideration: Einstein very specifically and carefully pointed out that the "time" he was discussing was objective, or clock time, not subjective time.

As a means of argument, to clarify the point by simplification, let's consider a spaceship taking off for an interstellar run. It is able to maintain a 1 g acceleration indefinitely, and is on an exploratory expedition to Andromeda. Immediately after take-off from Earth, there is an unfortunate accident, and a young physicist aboard is killed. His young wife and baby son are on board; his whole life had been directed toward making this trip. His ghost haunts the intergalactic cruiser.

Now a ghost, as everyone knows, is made of *ectoplasm,* which is not electromagnetic in nature. And a ghost doesn't depend on electromagnetic senses, naturally. This ghost being that of a physicist, he is understandably immensely interested in observing what happens as the ship approaches very closely to light speed.

Problem: What will the ghost observe?

Also, Einstein specifically stated that his formulas would not apply to subjective time. Suppose that subjective time is *not* altered by the relativity formulas. Then we would have a man aware of normal subjective time-rate in a body that, at very near light speed, took one hundred years to lift a glass of water to its lips.

Einstein did a magnificent job of describing what a One-Eyed Logical Observer with acute tunnel vision would appear to see in the Universe.

Anyone want to describe what a two-eyed observer, with full peripheral vision, and therefore able to see several things simultaneously would observe?

THE EDITOR.

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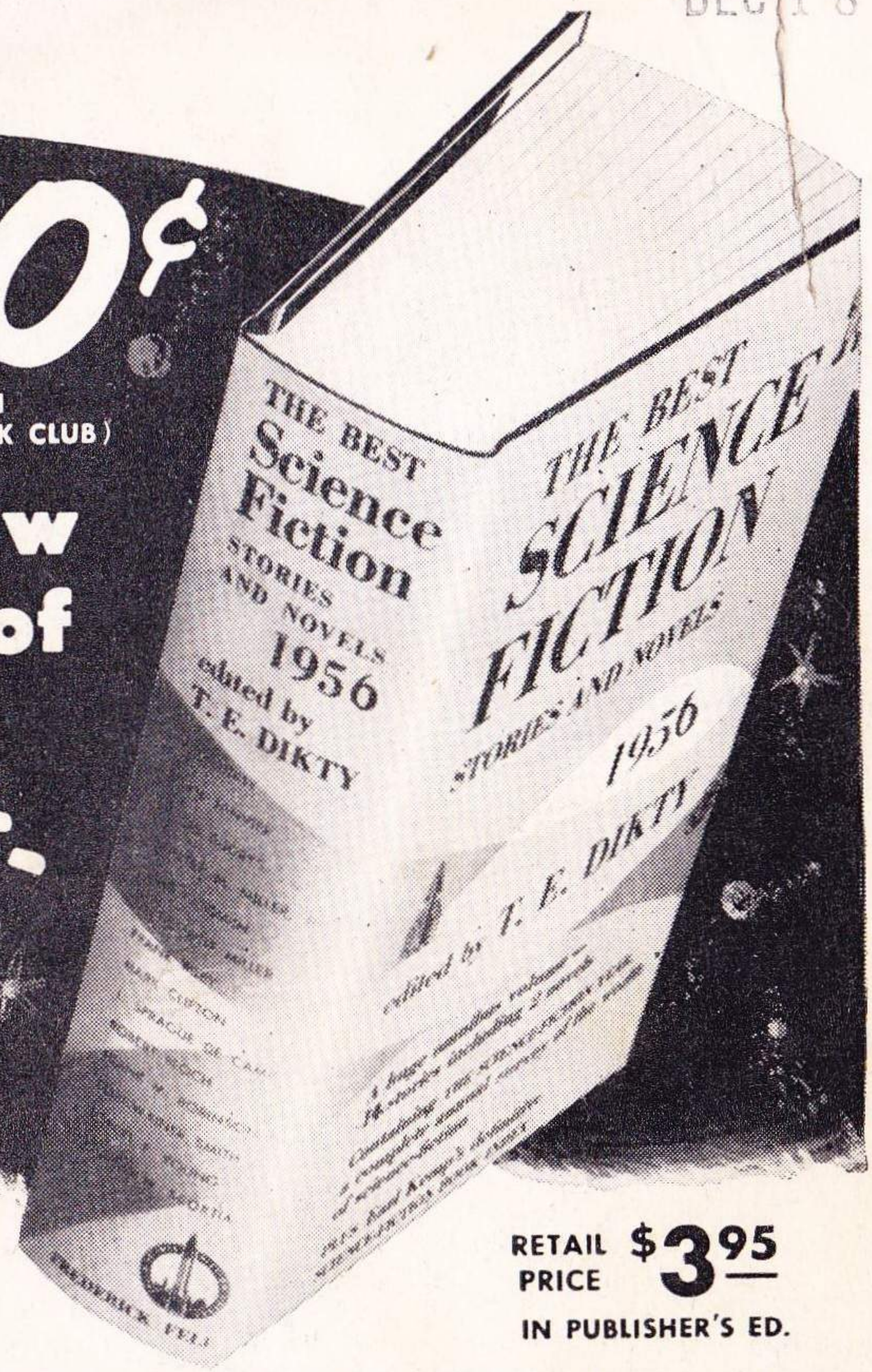

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