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The Emissary

BY JIM BROWN

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EDITORIAL

THE ULTIMATE WEAPON

It should be possible, by simply defining the desired characteristics, to work out in considerable detail the required nature of the Ultimate Weapon. Knowing the general nature of the Weapon, we should then be able to deduce the general approach required to produce it. With the present high level of Man's understanding of the Universe, it should be possible to define the field of research in which it can be found, if we can't as yet produce it. As a matter of fact, I believe that can be accomplished quite readily . . .

Basically, the Ultimate and Ideal Weapon must have the following characteristics:

1. It must absolutely wipe out all opposition.
2. The Weapon should be of such nature that no resistance to it will be possible.
3. Yet it must be of such a nature that the opposition cannot turn it against the original wielder.
4. While annihilating all opposition, it must not harm friends.
5. It should not damage any useful or constructive forces.
6. It should be of a catalytic nature, self-propagating, such that, once loosed, even the destruction of the original source cannot defeat it.
7. It will render all present weapons inoperative, making both atomic weapons and older weapons harmless.
8. Its power should be such that no power in the Universe can stand against it.
9. Its effect should not depend on surprise, so that even pre-erected specific defenses cannot defeat it.
10. It should cost very little to use.
11. The field where it has once been used should be permanently uninhabitable by the opposition, but freely accessible to friends. A self-propagating, catalytic type weapon would achieve this.

Some day, someone is going to create that weapon; it doesn't exist

yet, but logical deduction from the statements of the required characteristics clearly and unequivocably indicate the precise field of research that must contain the basic secrets.

As a professional science-fictioneer type prophet, I prophesy that Ultimate Weapon will be developed within twenty years. The basic ingredients for it already exist, and the precise field of research necessary to develop it is known.

The only trouble is, people have been looking for the darned thing in all the wrong places for the last seven thousand years. Yet the key to its nature is self-evident in the very first requirement — that it must wipe out all opposition.

Now consider this; if a man is afraid of you, there are several solutions. One, you can commit suicide. Two, you can kill him. These two solutions to that problem have been tried with amazing persistence for some seven thousand recorded years, and with one hundred per cent lack of successful outcome. Rome and Carthage feared each other; Rome killed Carthage . . . and generated such fear in others that, to relieve it, they killed Rome.

The Ultimate Weapon must wipe out all *opposition;* it must kill *War*, but despite the seven-thousand-year-old myth, it does *not* have to kill *men.* Actual field experiments, over that long period of history, have conclusively demonstrated that, as a matter of fact, the Ultimate Weapon *must not* harm men.

Instead of killing men, wiping out men, we want to wipe out opposition. We've been shooting at the wrong target, with the inevitable result that we haven't killed the real enemy.

There is one and only one type of force that answers all the requirements of the Ultimate Weapon. It's nonphysical, because any physical force can be countered by physical weapons and defenses. The only possible way to devise something that can never be resisted, and never will be resisted, is by devising something that is *desired.* The only possible type of weapon that can destroy opposition, and not harm friends, clearly, is one that attacks opposition itself — not people.

Opposition can be wiped out by inducing friendship; clearly, such a technique cannot be turned against the wielder, it cannot harm friends, and once the defenses against it have been overcome, no new defenses can ever be erected. Who wants to? Certainly no one whose initial resistance to friendship has once been overcome. And equally clearly, while friendship can annihilate opposition, it will not harm any constructively useful force.

This little dissertation may sound, to the man oriented in physical sciences, like a sermon, or a piece of nice, gentle, harmless — and futile — philosophizing. As of right now, we can't turn that trick. But, gentlemen, we

had most awfully better get the methods worked out, and make a sound, working technology of it. The one force in the known Universe that's greater than atomic energy is the power of human thought. That's self-evident; we make atoms behave, and do what we choose. The one defense against atomic weapons is a weapon of greater power — human thought.

In that utterly critical field, we are appallingly ignorant. The psychologist and the sociologist will, I know, protest; when the psychologist can find out how to make a catatonic schizophrenic drop his personal Iron Curtain, and open his mind to friendship, he'll have some useful information for the sociologist.

The sociologist complains that he can't set up laboratory experiments; he's wrong. Karl Marx had some fancy sociological theories, and to our sorrow was a sufficiently capable sociological engineer to actually get his theories tried out. Too bad he was not either a much better sociologist or a much worse one.

The astronomer can't set up laboratories to study stars, either, but they do a remarkably good job of getting information from existing stars. The sociologist is in a much better position than that, because he can get internal as well as external data on his problem.

At the present time, the United States is conducting a huge sociological experimental procedure; we're arranging to elect a president. If the sociologists really know the forces that actually influence a living society, they should be able to predict accurately the outcome of the forces now at work in the nation. A chemist can analyze a dozen ingredients, and predict with complete accuracy the result of mixing those substances, and predict what the products will be.

Because the sociologists do not respect the abilities of the men who actually practice their own field of work at the engineering level — the theoretician in many branches of science for a long time scorned the practical, engineering-level worker — the sociologists have not recognized that the most eminent workers in the field of molding societies are, in fact, politicians. It would be extremely helpful to understand precisely why men vote and react as they do. The one and only possible proof that such understanding actually has been achieved is the developed ability to predict how they will vote. Hindsight is useful only for one important purpose; recognizing that a mistake was made.

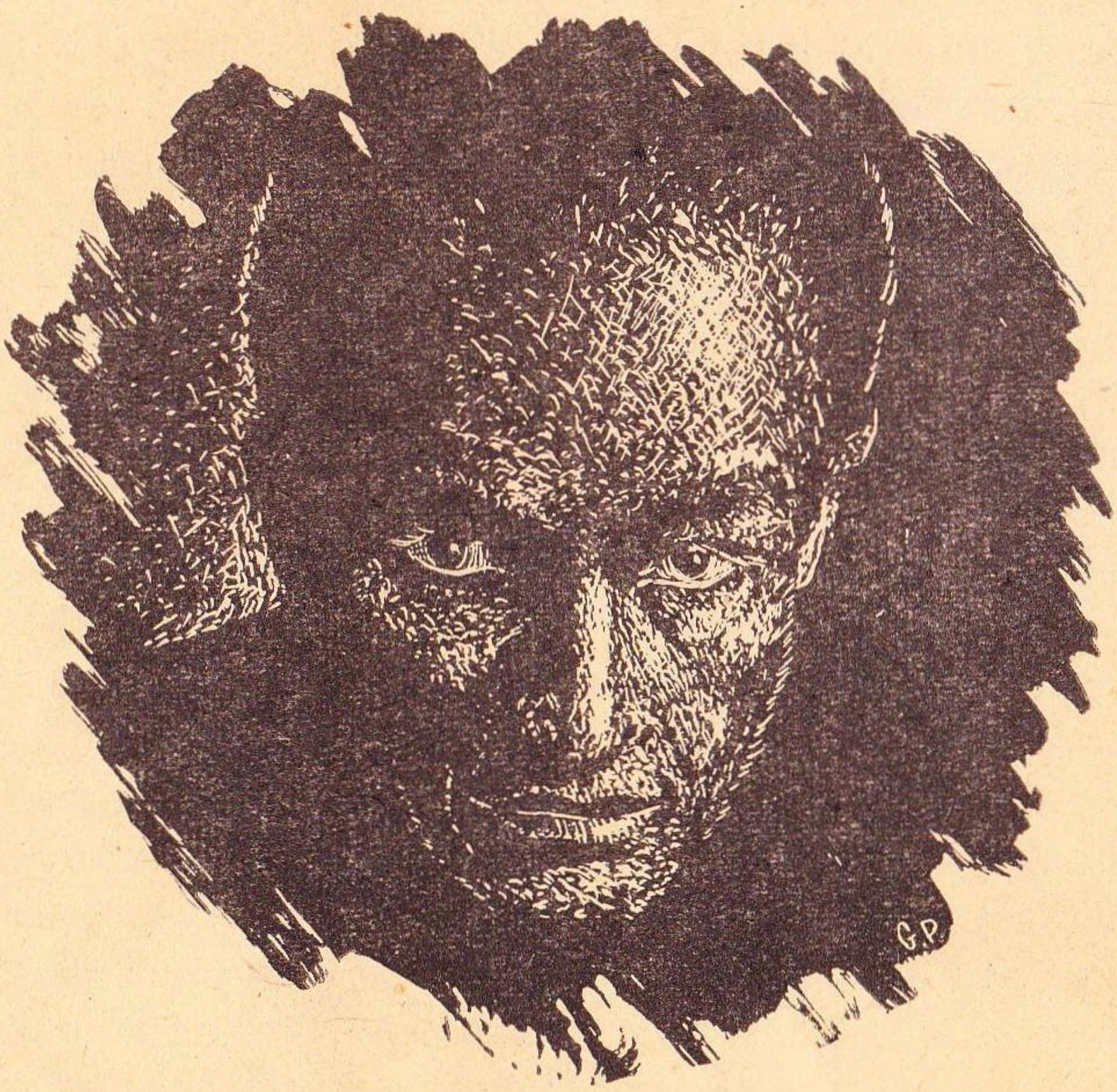
It seems to me that in that least-developed of all fields of human understanding, the human mind itself, must lie the Ultimate Weapon.

But there's one comfort; whoever develops it will be our friend.

Obviously.

THE EDITOR.

THE EMISSARY



BY JIM BROWN

Illustrated by Pawelka

A man may go mad; then he can be kept from causing harm by crippling him, by binding him—or, most effectively by curing him. And perhaps societies go mad, too . . .

"Big fellow," Manazetti said, gingerly leaning his hand against the ten-inch-thick glass wall of the cell.

"Bright-looking chap," I commented beside him. Then, mere physicist, I added humbly: "What do you think, Manazetti? Can you make any estimate of the creature's intelligence from his appearance?" Manazetti was the expedition's chief psychologist.

"Nothing specific. There are the usual evolutionary indices, of course: Big brain case; frontal arch well-developed. But then evolution takes some funny twists sometimes. I'd have to make tests before I commit myself."

We resumed our inspection, silently.

The captive *was* tall, a good nine feet, I should say, but for a humanoid, incredibly lean. His nude body was covered with a gray, downy fur that looked as though it might be very pleasant to touch. It would have given him a simian look had his forehead not been so high, his nose so narrow, his lips so full and short. He was a first-rate humanoid, if I was any judge. At the moment he was half-sitting, half-lying on a table, staring at Manazetti and me quite genially, I thought.

The psychologist, on the other hand, thought differently.

"Sullen fellow," he said.

I laughed. And explained.

"Still," Manazetti said when I had finished, "I don't like it." And strode away, I supposed, to get his testing equipment.

I stayed for a moment after he had gone. Then I, too, remembered some business and turned to go. The captive smiled, I think, as I was leaving.

I thought I knew what it was the psychologist didn't like. It had taken six of Earth's biggest cruisers and thirty-thousand armored marines to get that single captive. And it had taken them two weeks to do it.

We were, to put it bluntly, the scientific call-boys to a military task force, although our general orders talked rather misleadingly of "scientific exploration," the "extension of civilization," and the benefits to subject peoples of "democratic commerce." But the only good reason for the presence of the Terran Fleet here in this empty corner of space, nine light-years from home, was to conquer and, if necessary, destroy the population of a certain lonely cloud-bound planet in the system of Sirius and to convert it to a Class-A military outpost. It happened to be the bad luck of this lonely planet, and of the life that inhabited it—to possess physical characteristics—gravity, density,

soil-structure, and atmospheric composition—within two per cent of Terra's own. The only terraform deviation, in fact, was its thick layer of perpetual cloud. This made it an Earth-Type-Four on Terra's charts, and the only terraform planet of any type within seven light-years of the Inner Ring.

One conquest leads to the necessity of another, as every Terran schoolboy knows, and since the invention of atomic fission, the transtemporal drive, the gravitic force field and other notable landmarks in the advance of Terran science, Terran war vessels had been ranging in swiftly widening rings about old Sol for a couple of centuries, now. Sirius-A was to be just one more notch in Earth's expanding belt.

Was still to be, of course. Although the invasion had gone oddly and not quite according to schedule. Take the matter of the single captive that so worried Professor Manazetti:

Docile and backward enough, and entirely without weapons of offense or defense, the humanoid inhabitants of Sirius-A had nevertheless managed to evade the foraging marines with a skill that was a little uncanny.

Apparently no higher advanced than the most rudimentary rural level, the Sirians lived in tiny villages, scattered evenly over the great, parklike land areas of their cloud-swept planet. In these villages they were content to be observed—at a distance—either from land or from the murky air. And they offered no objection to the establishment of the nine preliminary bases prescribed in the invaders' master plan. But they scrupulously avoided all contact with their conquerors. They withdrew when approached by the most peaceful-seeming mission. And they literally couldn't be captured.

No Terran knew exactly how this skillful evasion was accomplished. A village would be selected for capture. Armored marines would draw up in impassable ranks around it. Gun-bristled aircraft would hover in the perpetual cloud above it. And, up until the last moment, the fated villagers would be seen going about their simple, rustic business—tending their land, working in their crude shops, or, more often than not, dancing or singing in alien loveliness in the ever-present village square. Apparently—though obviously not really—oblivious to the would-be conquerors surrounding them, they would play thus until the very moment of the strike. Then, as marines swooped suddenly in from land and air—they disappeared. Simply disappeared. The village and all its shops, halls, and houses would be quite in order, but empty. Every Sirian, from the oldest invalid to the tiniest infant would have vanished.

Some said they had the power of invisibility. Others, still more fanciful, spoke of teleportation. Being senior physicist I was asked to pass judg-

ment on this last hypothesis—and did so, cruelly. So the best-informed military opinion had it that they flew, by vessels or means unknown, to cloud-cover that always hung in the tree tops and, thus hidden, made their way to neighboring villages.

There was a good deal of evidence for this. Airmen back from a futile strike would report gray shadows in the mist. Marines were said to have heard sounds like laughter overhead. And neighboring villages *did* seem to be unusually crowded after such a strike. But no one knew for certain.

They were not invulnerable, of course. A curious naval pilot had tested this hypothesis one day—to his and everyone else's satisfaction. A stepped-down atomic disintegrator dropped over a village square had left a satisfactory but somewhat bloody pile of gray pelts on the grass. And a repetition of the experiment with anti-personnel bombs of the fragmentation type gave further proof that the evanescent gray creatures were at least killable. The subjects of the re-test were engaged in some primitive dance, at the time, and some very fine cadavers were secured for the medicos.

But there were never any wounded to be rescued and healed from these experiments. Evidently the last skill to depart the Sirian body was that of disappearance. Either that or with uncanny agility the unwounded carried off the wounded as smartly as they did themselves.

After two weeks of this, after the nine bases had been firmly established and secured against any possible counterattack, and just as any hope of "peaceful conquest" had been abandoned and rumor talked about the possibility of annihilation, the Captive had been found.

It would be a mistake to say that he had been "captured." He was found sleeping. In one of the back rooms of a rather small house in an otherwise empty village. He wakened easily and, offering no resistance, accompanied the somewhat nervous marines to the nearest spacefield. There he was taken by tender to the laboratory-ship *Dorian*, and safely installed for observation in one of the many glass cells. The *Dorian* immediately blasted out to seven hundred thousand kilometers and assumed a free-fall orbit around the misty planet. We were taking no chances. For all we knew the "captive" might change his mind.

That was what worried Tom Manazetti. Not that the Captive might *change* his mind. Tom would, I think, have been pleased with that. But that he had ever made up his mind in the first place—to *be* our Captive. This worried him. And, I must confess, it worried me for a while. Although, as I said, I am a physicist and do not understand these things.

"Now, look here, Manazetti," Culpepper, the old evolutionist was saying. "Science begins with astronomy

—always and everywhere. The first regularities noticed by any people are the movements of the stars. Here and only here are nature's laws openly displayed. And it is difficult to imagine a primitive intelligence first seeing the hidden regularity in nonstellar phenomena. Hence, no stars, no science. And Sirius-A, being cloud-bound, has no science!"

"Q.E.D." I murmured, and stopped to listen. There was little enough for a poor physicist to do, these days, what with the Captive, a bio-psychological phenomenon, occupying everyone's attention. Except to straighten out my more fortunate colleagues when they trod too confidently in my field. And . . . well, every physicist is secretly an astronomer at heart.

It was after the evening mess, in the second week after the Captive's "capture." I sat down beside Manazetti and prepared to take exception to everything Culpepper said.

"Sorry, Culpepper," Manazetti was saying amiably, "that doesn't necessarily follow. "One could, you know, start with less obviously regular phenomena, and still develop a science. It might take a little longer, of course."

I permitted myself a nod of agreement and turned to the biologist. I could see he was a little miffed at my taking sides so early. His rejoinder was directed half at me.

"I am not arguing for necessity, gentlemen. But only for probability. I am saying that the probability of physical science developing in a cloud-bound environment is relatively slight. And furthermore, we have empirical evidence of this." Glancing at the ceiling the biolgist consulted his tomblike memory. "Out of six hundred and seventy-three Earth-type-fours—Sirius-A is the seventy-fourth, gentlemen—exactly three hundred and three planets have developed life sufficiently intelligent, biologically speaking, to develop science. Not one of these three hundred and three races actually did so, however. Earth-type-four is a scienceless environment, gentlemen."

There was something final about all this. But Manazetti said:

"I grant your case for *physical* science, Culpepper, but—"

"And what other kind of science is there?" someone asked, not unkindly.

Manazetti grinned at his tormentor. "Why, in addition to psychology there are a few. Sociology, economics, anthropology —" He counted them off. "In a word, there is *social science*. Depending on physical measurement, to be sure, but nevertheless a branch of science that the Sirians might easily have developed despite their clouds."

But Culpepper was smiling at the sight of an easy victory.

"My dear professor," he began ponderously, "as you have yourself suggested, to the extent that any of these so-called sciences is a science it has adopted techniques first standardized in the physical sciences. Why, the very concept of 'measurement,' of 'experi-

ment,' of 'number,' even, have their historical origin in physical science. It is difficult for me to see, Manazetti, how any social science could develop without these concepts."

"Still—" Manazetti began. And stopped, somewhat flustered.

"What exactly do you mean by 'science,' Professor Culpepper?" I asked in the ensuing silence.

"I mean, Grant, prediction from measurement. Nothing more, nothing less."

"*Physical* measurement?" I pursued.

"Tactile, sensible measurement. That would include counting, of course." He eyed me warily.

"Then it seems to me you are begging the question, professor. Perhaps Manazetti, here, means something quite different by 'science'?"

Manazetti took me up like a flash. "Of course, I mean by 'science' simply a habit of mind, a respect for facts. Objective, unbiased observation. *Possibly* leading to prediction, but a prediction that may or may not be based on physical measurements."

"Then, it seems to me," I said, turning to Culpepper, "that something could well turn up on an astronomically-blind world that would not be science by your definition, Culpepper, but might be science by Manazetti's. A nonmaterial science not based on physical prediction, for example. Although, I confess, being a physicist, with a physicist's bias, I would be a little skeptical of such a so-called science, myself."

Manazetti laughed. "Now don't back down on me, Grant!" Then seriously, to both of us. "Look here, you two, you have just admitted that among us the social sciences bear the earmarks of their historical debt to the physical sciences. Concepts like 'social force,' and so forth. But obviously, they would bear no such earmarks had they developed independently of physical science. Right?"

"Right," I said.

"Proceed," said Culpepper dubiously.

"And without such earmarks we would not recognize them as science at all. Am I right?"

"Probably not," I said.

"If they were *really* sciences, we would," Culpepper said stubbornly.

Manazetti turned to Culpepper. "Look, sir, you yourself just now defined what is *really* science in such a way as to include one of these earmarks —physical measurement. Doesn't that mean that if you saw something *without* any of these familiar earmarks of science among us, you would certainly *not* be likely to call it a science?"

"It certainly does, young man. But I don't see—"

"Then it is also possible that some of the three hundred and three cloud-bound races you biologists have categorized as nonscientific, might actually have possessed a rudimentary social science without your recognizing it

was such. Is that possible?"

"I'm afraid he's got you, Culpepper," I grinned.

"I suppose he has," the old man admitted ruefully. "Still, I don't see that a 'science' that was unrecognizable as such could possibly be powerful enough to hurt us." He turned to me: "You know what our psychologist, here, is saying, don't you, Grant? He's convinced that the Sirians have something really devilish up their sleeves—a psychological super-science, or something like that."

"So I'd heard," I said. And smiled at Manazetti. "But on what evidence, I hadn't heard," I invited.

But Manazetti was reticent about his evidence, if any.

"I said they may have," he answered quietly. "Only that they may have a nonphysical science powerful enough to do us all in. There's something about the Captive that—"

"Nonsense!" Culpepper said. "You said yourself he has the mind of a high-grade moron."

"So he tests. So he tests," said Manazetti morosely.

Manazetti later told me something about those tests. The Captive had been a genial and willing subject. After the psychologist had learned from him enough about the Sirian tongue and the Sirian culture to transliterate his instruments for the Captive's use, Manazetti tested him. The results were precisely as expected: he had exactly the intelligence that Culpepper and his crew of evolutionary experts had predicted would be normal for the biological level of the Sirian body-form. This had satisfied Culpepper enormously; he was writing a book on morphological techniques of prediction. But it had strangely disturbed the psychologist.

"Look, Grant," he confided one afternoon. "Everything about the Captive is just what we expect. He's just as intelligent as we want him to be; no more, no less. The anthropologists are getting just the answers from him that they expected from looking at the villages. He's as rural and as primitive as the textbook says he should be; no more, no less. I tell you, it's got me scared!"

"Scared?" I laughed. "I'd think you'd be happy. If all my predictions came out on the nose—" I was having trouble with Sirius' halo-protuberances at the time. Neither the big star nor its companion had quite the subatomic conversion cycle that it should have had.

"Don't you see?" Manazetti pleaded. "It's just too pat. It's just as if he were playing a game with us. Like he knew exactly what we want him to say and then says it."

"Telepathy?" I asked sympathetically.

"No. Teleportation," he snorted and walked away.

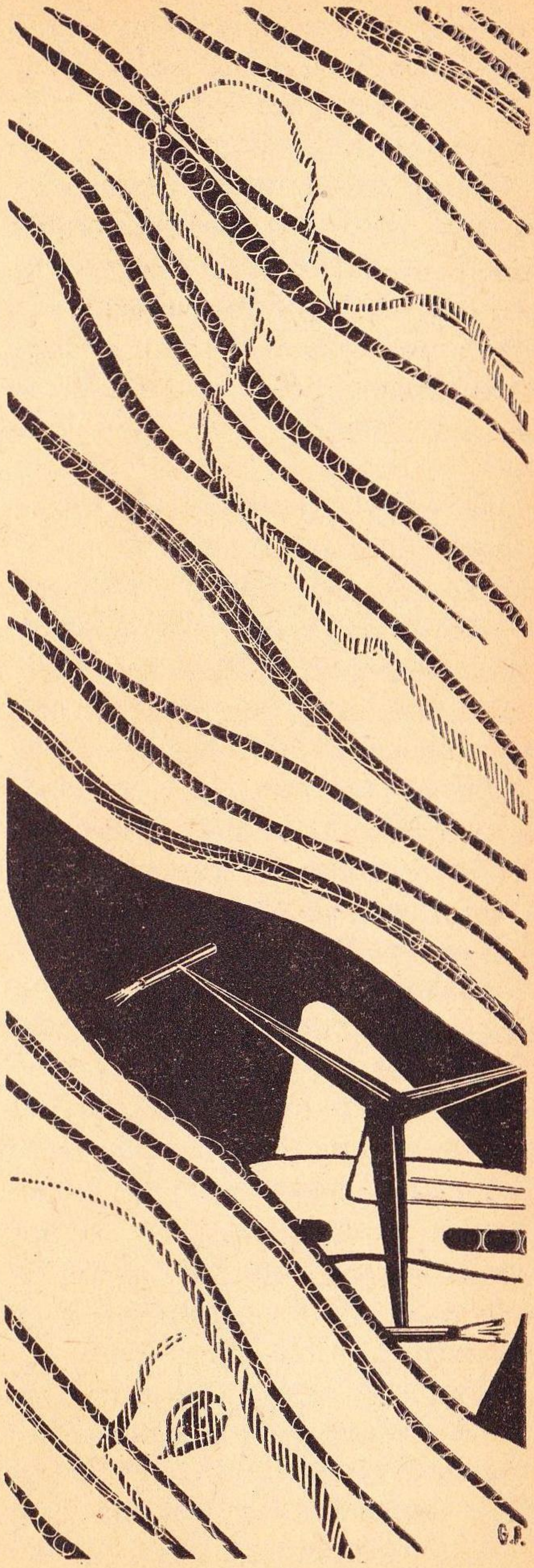
It was a crack, of course. The first

thing the military people had wanted us to get from the Captive was an explanation of that disappearance act his compatriots were so skillful at. The Captive was surprised at our question but willingly told us all he knew. This was simply that he and all Sirians could fly from birth.

The partisans of the "teleportation" theory were naturally very sad to hear that the Sirians could fly and that they used the cloud layer to travel in out of long custom, rather than from any specific desire to mystify us.

As to how they flew, the Captive could explain nothing. He could just fly, that's all, and was very surprised to learn that we could not. He offered to give us a demonstration and a number of neurologists, psychologists, and physicists were called in to take measurements. I had my crew set up a universal wave detector and we were not especially surprised to find that it was a negative gravitational field that the Captive generated when he rose effortlessly to the ceiling of his cage, and a repulsion field when he moved forward. Neither of these two wave-phenomena is exactly rare these days.

But we were all stumped on the exact manner of this gravicity generation in the Captive's body. With us, you know, it takes a couple of tons of highly refined equipment to generate a milliampere of gravicity. The Captive did it with a small gland weighing about two ounces in the center of his



brain-case, just about where the pineal gland would have been if he had been human. And the neurologists could tell us no more than that.

Well, it was just about teleportation, at that. I suppose Manazetti would not have been very surprised to find that the Captive was reading our brainwaves with a ten-gram electroencephalograph installed in the tip of his fuzzy nose.

For everybody except Manazetti, however, the Captive made life aboard the *Dorian* considerably pleasanter. Not only were he and his tribe the inexhaustible subjects of every conversation, but for all his high-grade moron's intelligence, the furry fellow was a friendly and amusing entertainer. It turned out that among his own people the Captive had been a singer and a dancer by profession and we aboard the cheerless *Dorian* put these skills of his to immediate use. The large room that held his glass cell became the center of after-dinner recreation for the homesick and the work-weary. And at such times the Captive would dance and sing for us in an effortless and altogether charming way, or answer numberless questions about his home and people with the naivete and quick readiness of a child.

There were many of us, myself included, who also made it a practice to drop in briefly on the Captive several times during the day and chat with him through the especially-contrived loud-speaker that communicated between the cell block and the larger room.

The military supervisors of our laboratory-ship at first took a very dim view of these proceedings, insisting that we secure passes and have them properly countersigned by the Officer-of-the-Day before visiting the Captive. There were not many of us, however, from physicist to historian, who did not have some legitimate reason for "studying" the Captive, and very soon the traffic in passes became so great that the military found themselves snowed under by their own orders. From that time on the pass-system was abolished and we were free to come and go as we liked, although the Captive, poor chap, stayed forever in his tiny cage.

It was not all play, however, for him or for us. By order of the expedition's commander in chief we were to prepare a comprehensive report, covering everything we could learn or guess about the Captive or his people. It was my job, of course, to discover the extent of the Captive's knowledge of physics, and by observing the physical plant of the abandoned villages, to prepare an estimate of the state of physical science among the Sirians. It sounded like an awesome task; but it was soon over. The Captive had no knowledge of physics.

"Captive," I once said, using the name he preferred to our garbled ren-

dition of his own musical name. "Captive, if you and a friend were carrying a heavy object between you on a long pole, and this object slipped up the pole close to your end, which of you would be carrying the greater share of the load? Think now, which end would be heavier?"

"It doesn't matter," he returned promptly. "Because if, as you suggest, the load were unequal we would simply set it down and adjust it until it became equal again."

And another time, in an attempt to find the spark of motive:

"Tell me, Captive. You have seen the machines we humans build to do our work for us. Wouldn't you like to learn to build such machines for your own people to use?"

He smiled. "No, Grant. I think your fine machines would make more work for us than they would save. You Terrans, for example, work far more and far harder than we do for all your machines. And are less fit for dancing."

"But aren't you curious, man, about the laws of nature? Matter? Energy? Motion?"

"Curious? Yes, as a boy I played with sticks and balls and wondered what made them as they are. But as a man I work with my fellow men and wonder what makes them as they are."

Thus Culpepper's thesis was substantiated for the three hundred and fourth time.

As for the villages—I made trips to several of them, in widely different sectors of the planet—the answer was everywhere the same. Their artifacts were the products of extremely skilled artisans, bearing the mark of ingenious hand tools of every description. But of generalized knowledge of the principles of operation of even these simple machines there was not the slightest evidence.

The findings of the anthropologists, I learned, corroborated these observations of mine. After days of almost continuous interrogation of the Captive and many field trips to the planet, they made the following preliminary report to the rest of us on the general state of Sirian culture:

The culture of the humanoid inhabitants of Sirius-A appears to be basically primitive and homogeneous over the entire planet. Despite the local variation in the art-forms practiced by these humanoids and despite the huge number of these forms—including all literary, graphic, musical, kinesthetic forms known to us and many more—the Sirian villages all operate at the same intermediate-rural, machineless level.

The Sirian villages are all small—less than three hundred population, economically self-sufficient, unfederated locality-groups. But while there is little commerce and no political activity between these villages, there is much personal mobility between them of both a permanent and impermanent nature. Indeed, a Sirian will normally change his residence from ten to twenty times in

a lifetime, usually but not always among villages on the same continent of the planet, and he will normally spend one fifth to one sixth of his life in travel over the whole planet, with a concentration of these traveling years in early adulthood. As far as can be determined there are no national differences, territorial boundaries, nor any other barrier to personal mobility.

Despite the importance of the village as the prime, perhaps the only, social unit, membership in it is surprisingly loose, being frequently changed and always voluntary. The political organization of the village is extremely primitive, there being no written law, no chieftains, heads, or authorities of any kind. For such few crimes as the villagers recognize, disagreeableness and failure to work being the principal two, the punishment is invariably expulsion from the village, frequently self-imposed and always informally and nonviolently enforced.

Kinship is of little importance to the Sirian social system, though genealogical records are kept. What passes for the family among them is a temporary association of two to eight or ten young adults and the children resulting from the apparently promiscuous sexual relations of these adults. The association last during the childhood of the offspring, rarely longer, but while it lasts its members of both sexes are partially freed from the necessity of village work, this time being given over to child-care and early education. Further education of the young is a village responsibility, as is every other social function, including the care of the few sick and of the aged.

While possessing a clear-cut ethic, largely centering around the values of cooperation and self-realization, the Sirian captive is unable to comprehend the notion of religion and no cases of religious practices have been observed among his people.

In summary, the Sirian culture is well-developed artistically but primitive in every other dimension. Although no instances of the superstitious and magical practices common to other primitive humanoid cultures have been observed among them, the Sirians have not developed nor shown any promise of developing a science of any kind.

There was something about this picture of Sirian life that, despite its apparent primitiveness, intrigued me. Shortly after the anthropologists' report had been distributed I buttonholed one of them, a young Sinoterran by the name of Lu, and after my usual apology for being a mere physicist, I asked him:

"But are you sure they are really primitive, Lu? They don't sound exactly savage to me."

"The word 'primitive' in anthropological parlance means merely 'nonscientific,' Professor Grant," the young Chinese smiled. "And we are fairly certain of that."

"So am I," I said. "But—"

"Savage? No. They are surely not

a savage people." He was silent for a moment. Then as if revealing a confidence: "As a matter of fact, professor, they are the most *un*-savage people I have ever encountered; *or* read about."

"Yes, they struck me the same way," I said. "Their refusal to play war with our soldier boys, for example."

Chin Lu laughed. "*That* may mean only good common sense, professor. Which, by the way, they also have plenty of. But what I have felt about their culture is something . . . well, *essentially* un-savage and peaceful—one of the culture-dominants, so to speak. They have never known war, y'know. And as far as we can tell, they know no conflict of any kind."

He stopped and gazed at me, wondering, I suppose if he dared continue.

"Go on, Lu," I said in as casual a tone as I could manage.

"Oh, it's probably nothing," he said with a careless wave of his slim hand. And began to move off.

"What's probably nothing?" I insisted, catching him by the sleeve.

"Their peacefulness. It's probably just hereditary—something like their furry hides. But it could be cultural. In which case—" He shrugged his shoulders and grinned at me. "Interested in anthropology, Professor Grant?"

"In which case, what?" I insisted.

"It is of no importance."

"In which case we might learn from them?"

"Perhaps," Lu said. And smiling his oriental smile he appealed to the urgency of his work and escaped me.

But the idea stuck and I did a little investigating on my own. I was slightly out of my province, I must admit, but the Captive didn't seem to mind:

"Chin Lu tells me your people have never known war, Captive. How do you account for that? Have you no pugnacious instinct?"

"Instinct?" he asked.

I explained as best I could that controversial term.

"No," he mused when I had finished. "I do not think we have a pugnacious instinct. We are born helpless and witless just like you. What we do we learn to do—even to fighting."

"Oh, you *do* fight, then?" I was strangely relieved.

"Oh yes. We have fights. But they are mostly among the youth."

"Ah," I said. "And what do they fight about? Girls?"

"No," he was openly amused. "No more than women fight over men. There is more than enough love for all, among our people."

"Well, then . . . property?"

Again, I had to explain.

"No," he said, but still half-puzzled, I could see. "We do not 'own' things, as you say. We have no money. We neither buy nor sell. We do, in fact, none of the things your economists, I

believe you call them, expect us to do. We simply discover what we need. And what we need we produce—as a group, as a village."

"So. There's nothing to fight over there. Well, then what *do* you fight over?"

"Self-possession. The thing that Manazetti calls dignity. That, I suppose, is the nearest word you have for what I mean. It is very important to us."

"Oh," I said. "I think I see, though. When someone's dignity is offended, then he fights. Is that it?"

He nodded. But I could see he was not very happy with my formulation of it.

"Well, we have fights over that sort of thing, too," I assured him.

"I mean, Grant," he said slowly. "That among the young, when pride is still fragile and untested, dignity is often worn like a shirt. It is easily soiled, torn, or scratched. Then there is sometimes danger. Insult. Shouts. A day or two of strained feelings between friends. For dignity is a precious thing and easily threatened among the young. Then one fights, for self-possession. But with maturity, all this passes away. Do you see, Grant?"

"I think so," I said, taking a deep breath. "Anger. Insult. This is what you mean by fighting?"

He nodded.

"I see," I said.

He waited until I had finished my rather painful grinning. And then he said: "You must not mind, Grant, that your people are yet young. Cultures, too, lose the savagry of youth—in time."

I shall have to confess that I developed a rather strong attachment for the tall, furry fellow. And through him for his distant people. For a while I was rather ashamed of my potentially treasonous affection and kept it well-hidden, even from the Captive. But I soon learned that my feelings were rather widely shared.

"D'you know, Grant," Culpepper stopped me one day in the corridor, "that Captive fellow has a definite flair for setting things right. Two of my assistants, Brown and Littlejohn, have been having a rather beastly feud for a month or so. And yesterday, I saw them walking arm-in-arm like buddies. Naturally, I inquired a bit. D'you know what they told me?"

"That the Captive had been talking to them?"

"Exactly. And I hadn't been able to do a thing with them. Yes sir, a definite flair."

Culpepper was very pleased. And so, it turned out, was everybody else who had any occasion for contact with the Captive—except Manazetti. The psychologist was still holding out for his something-dirty-afoot hypothesis.

One day I made the mistake of defending the Captive to him, for his exemplary behavior under rather trying circumstances, it seemed to me.

"He hasn't had to act up, Grant," Manazetti objected. "Things have been going just the way he wanted. You wait, Grant, until something goes wrong for his people. Then see what a fine fellow he is!"

"But what could he do, man?" I asked. "We still keep him in that foot-thick cage of his. And even if he got loose, somehow, he could do nothing at all to hurt us. He knows nothing, absolutely nothing, about armaments or machinery. I can guarantee that."

"I know," the psychologist replied. "But he knows a good deal about us."

"So?" I said, mystified.

Manazetti puffed silently on his pipe. Then, irrelevantly: "Did I tell you he's reading books, now?"

"No!" I said, delighted. "Who swung that for the poor devil?"

"Culpepper."

"Well, well," I said, already looking forward to my next talk with the Captive. "Censored stuff, I suppose."

"Yes. No technical material. Just novels, biographies, and . . . oh, yes, he loves history books."

He sucked on his pipe for a moment. Bewildered I asked:

"And is that wrong? Is that, too, the sign of the devil?"

He ignored me and turned to go.

"And oh yes," he added as a parting shot. "I found out that he knows mathematics. Calls it a game his people play. But it's math, all right."

That did puzzle me a bit. I never would have guessed it.

But Manazetti had been right about one thing: things had gone smoothly with the invasion since the capture of the Captive; and hence, for the Sirian people. Somehow mollified by the presence of our single captive, the admirals had removed the pressure from the field commanders who, well sick of it by this time, had suspended their futile efforts to contact or capture the natives. And there were no more "experimental" bombings of the villages. Blake, one of the physiologists in the research section, had put up an awful stink about that, finally going straight to the General Staff itself, with his protest thinly veiled in "scientific objections." Blake won, finally, but it wasn't for the decent reasons he'd had in mind.

For it was now obvious that the Sirians had no great objections to our use of their planet for military installations. Or if they had, they took great pains not to reveal them. For except between ourselves and the lonely Captive, there was still no communication between the conqueror and the conquered. Fundamentally, the military did not wish to jeopardize this curious truce until their bases were permanently secured. Twelve great armored spacefields were to be built, together with repair and supply facilities enough to serve Terra's entire fleet. For Sirius-A was to be the stepping stone to the outer galaxies. No pains were spared and for two weeks, engineers and soldiers alike devoted themselves ex-

clusively to this mighty task.

Even so, the situation was an unprecedented one for the military and, one gathered from the boastful conversation of the junior officers who staffed the *Dorian*, they felt a bit uncomfortable and somewhat offended by the queer stalemate their victims had forced upon them.

Rumor had it that the "security-minded" voices in the military councils were still pressing for "protective annihilation" of the Sirians even after two weeks of unbroken, if silent peace. They argued, the story ran, that the Sirians might be treacherously biding their time. That they were silently waiting for the Terran warships to leave, once the bases were established, then to pounce on the marooned garrisons with weapons they had cleverly not yet shown, annihilating our troops to a man. The story went on to depict the bloody reception our tired ships would get from their own guns when they returned. Thus ran the eternal pessimism of the military mind.

The powerful representatives of the Imperial Government, rumor further flew, showed great resistance to this wanton slave-killing. Instead they pressed, in their turn, for the "extensions of civilization," for the immediate incorporation of Sirius-A as a colonial territory in Terra's democratic empire. And these auspicious developments, they rightfully insisted, would have to be preceded by greater contact with the aborigines than the military had yet achieved.

Opposed to both these points of view were the representatives of Terra's mighty commercial interests. Officially powerless, these men yet had the traditional rights of big money to dictate the terms of war or peace. Knowing that the deepest footholds in a colonial economy are to be dug before government takes over, and knowing also that no money at all can be made from dead customers, they suggested a compromise proposal: Let the military make their bases invulnerable; then, working from these bases, let private citizens open up the territory as the government wished. But let them do it in their own way. And let the soldiers stand ready to defend the rights and skins of Terran citizens—by reprisals if necessary. And in return civilian traders among the aborigines would keep the military informed. It was the age-old pattern.

In the end, as always, the big money won. At any rate this was the news that trickled down to the crew of the *Dorian*, a dozen administrative steps away from the scene of decision. And with it the news that the "private citizens" were on their way.

"And tomorrow the vultures will be here," Blake remarked grimly, referring, everybody knew, to the swarms of trading ships, miners, looters and fortune hunters that hovered in the wake of every military expedition—waiting for permissions to land.

"I wonder," I mused aloud, "what it will look like a year from now?" The Captive's parklike planet and the carefree, moneyless, uncomplicated lives his people had lived there.

"It was inevitable, Grant," Culpepper said, "as inevitable as human nature." But he was sad, this evolutionist, and angry at his own neat formulae, one could see.

We were sitting in the lounge, a small group of us, and discussing the news.

"Well, our work is done and we'll soon be home," someone said, in an attempt at cheerfulness. It was received with silence.

Then Chin Lu said: "What will they do with him—the Captive, I mean? Our report on him is finished. Do you suppose they'll let him go home?"

"I shouldn't wonder," I said, more optimistic than I had any right to be after a year's contact with the military mind.

Then I heard someone ask Manazetti: "How will he take the news, Tom, that the commercial fleet is arriving?"

"I don't know. I don't know."

There was something in his voice that made me turn and look at him. He was more disturbed than I had ever seen him. He continued in a low voice.

"But I've an idea his friends aren't going to stand for it when the beggars actually go to work on their lovely little planet."

As usual the dour psychologist was right. Radioed-in like fish in a net, the commercial fleet landed on Sirius-A before the week was out. And then, just two days later, the flash came. The fleet was in flight formation, set for a two-weeks' cruise in the unknown space beyond Sirius, and we in the *Dorian* had the starboard tender out to take the Captive home when the intercom howled on the flagship band:

"Attention all ships, all hands! Assume battle stations. Battle Plan 14-C. Can raise no ground station on Sirius-A. Believe all garrison personnel have been overpowered, possibly annihilated."

And then from the commander of the *Dorian* to his crew:

"Attention all hands. The *Dorian* is proceeding to deep space in compliance with Battle Plan 14-C. The Captive will be kept under double guard. Force fields will be thrown up around the cell block. He will have no civilian visitors. That is all."

Most of us had collected in the cell block viewing room to bid the Captive farewell. There was a confused buzz of angry, disappointed talk when the intercom snapped off.

"Now, what'd they do that for?"

"Couldn't they have waited until we'd delivered the Captive?"

"Could've at least waited until we'd blasted off a bit!"

"Yes. What'll they do now?"

"The real question is: What will *we* do now?" It was Blake's voice; hushed,

stony and troubled.

Nobody knew.

But everybody knew what we might do. What we were capable of doing with the planet-shattering atomics our battleships carried in their bellies—or the incendiary gases. Everybody knew about the seared and blackened planets that stood in the wake of Terran Progress. And nobody looked at the Captive as the guards hustled us out.

The *Dorian* dutifully transported our valuable scientific carcasses into deep space. Then we waited. At first there was no news. Then on the second and third day the news trickled in. All work suspended, we listened to the intercom from our separate cabins:

"Landings made on Sirius-A. No resistance encountered."

"All bases on Sirius-A undamaged. All garrison personnel departed. There are few signs of struggle."

"Enemy losses slight. Three hundred and fourteen enemy dead found in and around empty bases. No Terran dead have been found."

"Sirian villages appear to be empty."

Then, much later:

"Thorough search has disclosed no living being on planet Sirius-A. All enemy villages have been abandoned. No signs of the thirty thousand missing garrison troops have been found to

date. Search continuing."

"It is believed that our troops have been captured and carried to the cloud-layer above Sirius-A. Sirians are known to fly effortlessly. It is possible that the entire Sirian population is aloft."

Then came the order that set the physiologists on their ears:

To: Research Section, Dorian

From: CINC

Prepare precise estimate of maximum duration of Sirian flight without food. Report within three hours.

Genially, the Captive hovered for one hour at the roof of his cage while the physiologists tapped his alimentary system at nineteen index points. Then they took their data to the computers and worked feverishly for an answer.

At the end of two hours and twenty minutes the second order came:

To: Research Section, Dorian

From: CINC

Ignore previous order. Sirians are obtaining food. Can Sirians fly while asleep?

It was delivered to Blake who was Senior Physiologist. He tossed the paper into the air, cleared his computer of a figure in nineteen decimal-places with a great *thrrrmp*, and announced triumphantly to the assembled company:

"Hot rockets, fellows! They're getting food!"

One of his more restrained colleagues retrieved the fallen spacegram and consulted the Captive briefly.

To-CINC

From: Research Section, Dorian

Yes. With food they can fly indefinitely.

One of the navigation officers on the *Dorian*, whose brother was a pilot of a Landing-Aircraft-Personnel on patrol duty over Sirius-A, said that his brother, with whom he played chess by spacephone every evening, said that they were rigging infrared-controlled nets to catch gray fish in gray soup. And that while on watch if you listened carefully you could sometimes hear them singing in the mist.

We stayed out there for nine days doing useful bits of scientific work—like spectrographing Sirius equatorially and counting the sweatglands per square inch of the Captive's skin—and then we received orders to go home; and to take the Captive with us.

Nobody knew quite why. Except that perhaps they wanted to give the Captive a more thorough going-over, in the light of new developments, than we could handle in the tiny laboratories of the *Dorian*. Or maybe because the high command was getting jittery over the ill-concealed sympathy the *Dorian's* crew had developed for the Sirian captive.

But whatever it was we were—well, frankly—delighted. For most of us it meant the end of our tours of military duty. "One year or one completed space flight, whichever is the

shorter" our draft papers read, and we were glad to accept this unexpected alternative, despite our second-thought pity for the now permanently-captive Captive. And anyway, in his primitive way, the furry fellow did seem the slightest bit eager about it.

"I have given up hope of returning to my people," he explained to us. "And since you have permitted me to read about Terra I have had a curiosity about your people that only a visit will satisfy."

A visit! God knows how they would treat this "visitor" on Earth! The poor fellow didn't know that his present scientific hosts were perhaps not typical of Terran prison-keepers in general. And we had not the courage to enlighten him.

But we tried to make the trip, at least, as pleasant for him as possible. He was allowed to read pretty much as he liked. And at our insistence the old freedom of visiting with him was restored.

As usual, he was explicitly grateful.

And so was I. With the termination of my research duties I found myself with the free time I had long wanted to devote to the Captive and the exotic puzzle he presented. His fascination for me was, if possible, enhanced by the new turn our conversations took when he had begun to read. Now he asked the questions, and of Terra, but with a pungency and charm that was an unfailing delight to me. Called forth largely by his reading, he would save his questions up for me; and when I arrived each day:

"What unnatural thing did we humans do today?" I would invariably ask.

"Well, Grant," he would begin smilingly, "I read here that all young Terrans are taught in school that if only they work hard enough they can all be millionaires. Yet I am almost sure I remember reading the other day that only a tiny fraction of one per cent ever achieve that enviable stature. And that these few do so largely by birth. Now Grant, explain to me how this can be."

"Perhaps the rest of us don't work hard enough," I might say. And thereby duck the issue. But more often I would try to peer with him—sometimes almost guided by him—into the inner workings of our complex Terran society. I am a physicist by inclination and by training, but I had often wondered about the strange contradictions and inconsistencies we Terrans live by, as a man will who is not wholly blind. And it was as if my eyes were focused and the old wonder deepened by my conversations with the Captive; he had the insight of the proverbial man-from-Mars.

We had one other pastime, the Captive and I. As Manazetti had hinted and as the Captive openly informed me, he did know a kind of mathematics. It was zero-less and in other ways quite crude, and devised, apparently,

for the construction and solution of numerical puzzles of the simplest kind. The Captive was amazed at the speed with which by calculus, for example, or by matrix algebra, I could solve the most difficult puzzles his system was capable of. He would throw impossible constants into a tortuously formulated equation and then watch with delight as I translated and solved them on one of the small pocket computers I always carried with me. At such times he would carefully note the answers I arrived at as if to check some more laborious process of his own.

One day I offered to get a computer for him, for he was clearly fascinated by it and I knew that no possible harm and much possible good might come of his solving a few puzzles on his own. He was delighted to accept and after some embarrassed reflection I found a way to smuggle the small object in to him with his food. After that our game-playing took on a new and, one might say, almost professional flavor.

I was not the only one who found it profitable to spend time with the Captive. Despite the fact that all pretext of studying him was gone, now that we were no longer attached to the fleet, several of my colleagues were to be seen with him quite frequently. Culpepper especially, and Chin Lu, Blake, the physiologist, and of course, Manazetti, all spent nearly as much time with the Captive as I did. And, I suppose, for much the same reasons. Though oddly enough, we never had occasion to talk about these reasons among ourselves.

For all of us, however, long talks with the Captive were soon over. The nine light-years to Terra, with the latest thing in transtemporal drives, took the *Dorian* slightly less than a month to traverse. During that time we would hear occasional reports from the beleaguers of Sirius-A. They had domed all twelve bases with impervial lucite and manned them with fresh troops. They had succeeded in netting another captive. No, he had escaped. They were sweeping whole continents with steel nets. But the Sirians had finally foiled even this ambitious scheme by simultaneously jumping over and under the nets and back in the soup again, carrying, of course, the thousands of captive Terran troops and thus effectively holding Terran fire. Then there was silence for a while. At our distance the whole operation began to seem just a little ridiculous. Why not bargain for the return of the thirty-thousand and the handful of privateers who had started the fuss, by promising to forget all about their precious planet for once and for all?

Still, we couldn't communicate with the Sirians to strike any bargain. And if we could they would be fools to trust us. Given time, some bright Terran physio-physicist would figure out a way to blanket their gravicity glands

en masse and that would be the end of the Sirians. And they undoubtedly knew it.

At least the Captive did. And he would smile at our hypothetical armistices to the strange war.

When the real armistice came, therefore, it was most unexpected. And, with usual Sirian ingenuity, unexpectable. It was the day before the *Dorian* made her planetfall on Terra that we—and Terra—got the news:

One morning before daybreak the thirty-thousand captive troops were deposited simultaneously and in small groups at the portals of all twelve of the newly-domed Terran bases. A rapid count showed that they were unharmed and present to a man. Suspicious of a trick the Terran planetary commander had given orders to transport the thirty-thousand to deep space for interrogation. Space crews were relieved to make room for them and extra troops were mounted in the planetary bases. During the general alert that followed, air patrols swept the planet. Throughout the day Sirians were observed returning to their villages. By nightfall population density in the villages seemed about normal and all over the planet normal Sirian life had been resumed. Thus, in twelve hours time, except for the wear and tear on Terran nerves and the garbled stories of thirty-thousand somewhat tired marines, Sirius-A was returned to the bucolic normalcy of forty days before. The whole bizarre episode might have been a dream.

There was but one exception to this startling return to normalcy: one hundred and fourteen private Terran citizens—miners, traders and pirates, by profession—were still missing. The best intelligence had it that they still floated, on the fuzzy arms of Sirians, in the clouds.

But still there was no communication from the quixotic defenders of the planet. Although now the implication was clear: The Terran army was tolerable—provided it stuck to its bases—but Terran privateers were not wanted on Sirius-A. And the penalty even clearer—swift and unpredictable, enormously troublesome but essentially harmless strikes at Terran nerves.

So be it.

The commander in chief of the task force at Sirius, on direct order from Imperial Headquarters on Terra we heard, put Sirius-A out-of-bounds to civilians indefinitely. The remains of the commercial fleet, hovering nervously but impatiently on Sirius-A's fringe these forty-odd days, dribbled off to some more hospitable sector of Terra's expanding universe.

That could have been all. The story of the Captive and his strange people could have ended here. And with few exceptions the crew of the *Dorian* thought it had; as we landed on Terra the ship fairly burst with the exulting news of the Sirians' apparent victory.

It was not until we had actually landed, until the *Dorian*'s cargo of scientists was discharged, and luggage in hand, we waited on the concrete landing apron for transportation to our homes, that we heard the news of Terra's reprisals on Sirius-A.

I was standing with Blake and Chin Lu at the time, a little distance from the tall figure of the Captive—waist-high in a cluster of armed marine guards. They were to take him, we understood, to the squat prison-ship standing a quarter mile off from the *Dorian*, there to be shipped to a top-secret laboratory where the mystery of his famous gravicity gland was to be puzzled out. As far as any of us knew, we would never see him again. The four of us were smiling good-by when a junior officer hollered down from the main hatch two stories above our heads:

"Hey, you guys! We just bombed Sirius-A!"

"WHAT!" The cry came from a hundred scholarly throats.

Blake's hand tightened on my arm.

I could not take my eyes from the Captive's rigid face.

The excited shout over my head continued:

"Yeah! A hundred forty-six villages. Wiped out. Every village within ten kilometers of the domes. Cordon sanitaire, the report says. Sounds like just plain reprisals to me—"

There was more. I didn't listen. The marines guarding the Captive had begun to move. Blake's hand had numbed my arm from the elbow down. The Captive, his tall frame bent like a broken willow, was being pushed into an armored car. I caught his eye just before he disappeared inside. He was smiling.

Blake had gone limp beside me. And Chin Lu said, to both of us, I suppose:

"You see? He was smiling. So let us not despair, my friends. We have work to do."

Despite Chin's good advice, Terra did look ugly as I flew toward the university and home. Black, pocked, sprawling; cluttered with misshapen man-hills and the ceaseless trillions of man-bodies swarming over it: the Prime Globe, the center of the universe.

It was just under a month later that I saw the Captive again, for the last time.

It had been an exciting month for me. Back after my year's long trick with the military the academic atmosphere seemed Utopian. It was pleasant to apply one's brain to problems that did not directly implement murder and war. And it had been my good fortune to run onto a fascinating project soon after returning. Although it was not exactly a problem in "pure" physics, perhaps not even essentially a problem in physics at all, it captivated me entirely, and I had thrown myself into it with an abandon which

Manazetti would surely have labeled cathartic. Well, perhaps it was. I fancied myself relieved of a burden of guilt I had carried since my college days. Since the day, in fact, when I had discovered in some out-of-print history of science the name Hiroshima.

I heard or saw little, in that month, of my former colleagues. Professor Culpepper, I learned from the news-visor, had wrangled a rather high post in the government colonial service. This seemed odd; the old blighter had been so incorrigibly academic. But he seemed happy when I ran into him one day in Washington and explained it away with some embarrassed talk of "service" that fit him well enough.

Blake, the physiologist, I heard of quite frequently. He had accepted, also unexpectedly, the headship of a hospital research group that served the black continent, Africa. Virtually quarantined on this miserably inadequate chunk of their native planet, the several billions of Terran black-fellows were subject to an unending series of plagues and pestilences. Blake, in his forthright way, was making a smell about it in all the visors.

And Chin Lu I heard from only once. He wrote me that he was returning to his native Asia and would be engaged, he said cryptically, on an "organizational problem of some anthropological interest."

Manazetti I neither saw nor heard from. I had a psychological problem of some moment at one time during that month, and remembering his quick wit I made inquiries. Except to learn from the War Department that he, too, had finished his tour of military duty and—like all scientists—had failed to re-enlist, I found no trace of Manazetti. I wondered occasionally what and how the dour psychologist thought about his suspect now.

From Sirius-A there was nothing but good news during that month. With characteristic patience the Sirians had accepted the wanton destruction of the twelve rings of villages around the Terran bases almost as if they had expected it. Thenceforward the armistice they had initiated by returning their thirty-thousand captives had remained unbroken by either side, the Sirians going on with the plain business of living, the Terrans strengthening their positions with unbelievable armor and making feverish preparations for the conquest of the galaxies beyond Sirius.

Here on Terra the home population watched these developments nine light-years distant with declining interest. Conquest had become an old story to the Terran visor-watcher and it was not until the news was published that the original thirty-thousand ex-captives were being returned home, utterly unfit for soldiering, I imagined, that public interest was again aroused in the Sirian campaign. Evidently half the fleet had been detached from Sirius to return them while the Home Fleet was now being sent to Sirius to

relieve even the commanders in this strange and wearing test of Terran arms. For my part, I watched these developments with considerable interest, feeling, oddly, that I had a personal stake in the outcome.

The thirty-thousand were two weeks on their way home and my own work was virtually completed when I received the call. I was to report to Washington immediately—a top-level conference concerning the disposition of the Sirian captive, and that he would be present. More, the top-secret visogram did not say. My heart filled with the prospect of seeing him again and I grabbed an aircab from the physics building roof. I was in plenty of time for the 5:30 Washington rocket and I stopped in the airport waiting room to hear the 5:15 news. As soon as it began I stepped to the bookstall and buried my face in someone's *Pocket History of the Empire* in order to conceal my excitement. Above the noise of the home-going crowd this is what I heard:

"Africans revolt! Upstart union calls general strike."

"Jailed spokesmen deny charges of conspiracy."

"Chinese delegation unexpectedly withdraws from Imperial Assembly. No explanation given."

"Sporadic riots noted in Moscow and Berlin. Imperial Police report no cause for alarm."

"The Secretary for the Imperial Colonial Service reports temporary breakdown in over-space administration. Cause or causes unknown."

There was more; but I had to catch my rocket. Finding a seat I found myself grinning foolishly. Everything had become clear. Blake. Culpepper. Even Chin Lu. I wondered excitedly when my turn would come. And Manazetti. What was Tom Manazetti slated for?

There were little knots of Amerterrans on the streets as I taxied over Washington. I couldn't hear what they were shouting about and the cab driver didn't know. But the noise had grown to a city-wide rumble by the time we reached the first ring of sentries around the Imperial Mansion.

Inside it was cool and silent and I had time to collect my thoughts as the uniformed page led me down long carpeted corridors to the conference room.

"You're a bit late, sir," the page whispered—sympathetically, I thought—and opened the door. Straightening my shoulders I took a deep breath and went in.

The room was a small one for the imposing company it held. There was scarcely room for the large table and perhaps a dozen chairs. There was one door, flanked by two armed guards. And one tall window opening onto a balcony.

"Hello, Grant," someone said.

It was Culpepper. I took a seat beside him.

"Hello," I said. And looked round

the table.

Culpepper was on my left. On my right sat Blake. I smiled at him. He grinned back, a strange, exultant grin. Staring peacefully into space just beyond the physiologist was Chin Lu. He had not seen me and my gaze moved on around the table. Manazetti was not there.

At the head of the long table sat the great wrinkled head and wizened figure of the aged Emperor-President, Christopher Smith. He had been emperor when my father was born and would probably be emperor—if his doctors didn't abandon him—when my sons died. I passed over his face quickly for I was a trifle unnerved at being face-to-face with the classroom portrait of my school days.

Strung along the table across from us were four uniformed men: Carlsen, Chief of Defense; Van Hooten, Chief of the Colonial Service; Abercrombie, Commander of the Terran Marines; and Manilowski, Chief of the Imperial Secret Police. I knew them all—by television. But I had never expected to be sitting across the table from any one of them, let alone all four.

The Captive was not present.

"Gentlemen" purred the century-old larynx at the end of the table. The conference had begun.

"Gentlemen, we have called you together tonight to discuss the Sirian captive, and . . . well, your relationships with this enemy of the Empire. Certain events have brought to our attention your . . . to put it bluntly, your treasonous behavior in the month since your return to Earth."

The voice paused for a moment and from the soft purr of a gently reproachful friend it became the rasp of hate:

"This is your trial. Unless you can explain your actions to my personal satisfaction, the four of you will be shot in the morning. And gentlemen, I am hard to satisfy."

And again softly:

"But while you are still alive these officers and myself should like to know the nature of the influence . . . perhaps, hypnosis, this enemy spy has held over you. You see, it will gladden our memories of you, gentlemen, to know that is was *his* will and not your own which prompted you to these traitorous acts."

Suddenly and shockingly, Culpepper laughed.

"Why, my dear fellow," he chuckled, "do you find it so difficult to imagine that a man could *want* to be rid of you? All by himself? You and your brass-button boys?"

One of the guards in a spasm of well-trained fury unholstered his side arm. But the Emperor-President raised his hand. The gunman stopped as if struck.

"Go on, Professor Culpepper. Am I to understand that you have wanted to be a traitor? For a long time?"

"For a very long time indeed," the old biologist admitted cheerily. "You

see, like many a loyal subject whose eyes you have permitted to remain open and whose mind you have permitted to be trained—for purposes of your own, no doubt—I have long been aware of the foul stink our great Empire makes in the Universe. But like all your subjects I had no idea that I—nor anyone, for that matter—could set it right. So treason, as you call it, was pretty much out of the question. Until—"

"Until the Sirian prisoner showed you how it could be done?"

"Exactly."

Rigidly the great head turned to the chief of the Colonial Service.

"Tell us, sir, Dr. Culpepper's crime."

Crisply, the story rang out:

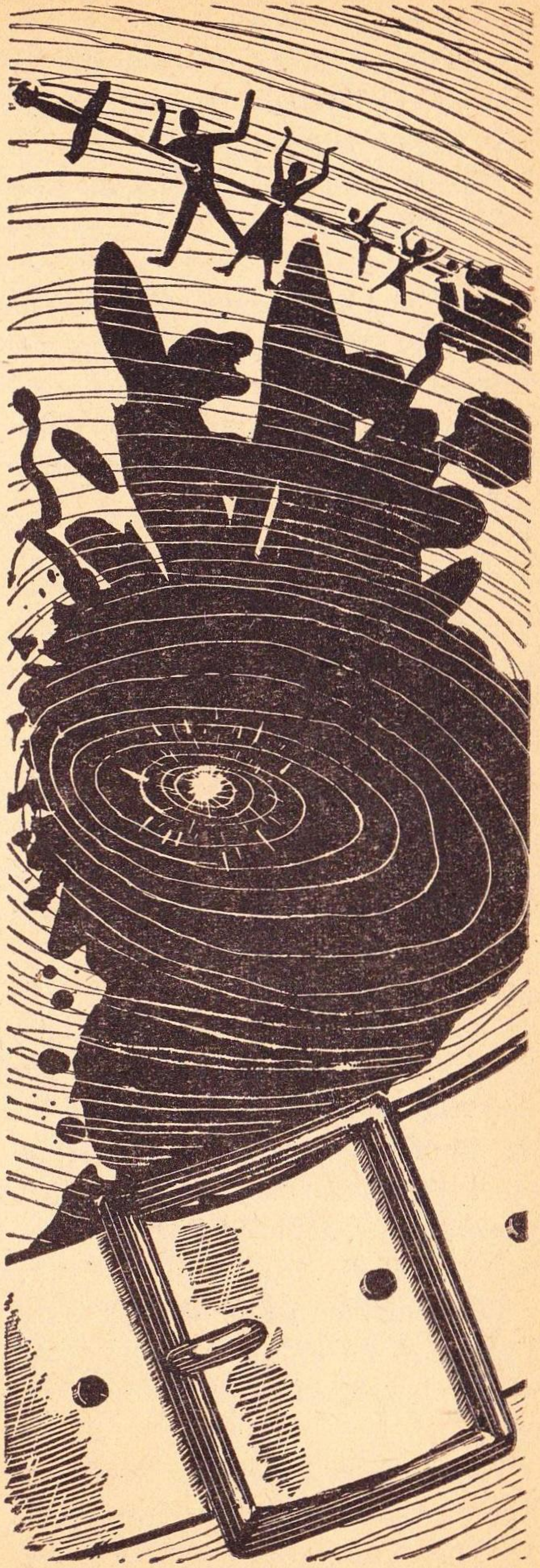
"Two days ago, your Imperial Presidency, an order came to my desk addressed to all colonial administrators throughout the Empire. It was signed by this man, who was, unfortunately, given a post of authority in my office. The order instructed all administrators to disband the colonial police, to turn over all arms and monies to native authorities, and to liquidate their installations and report home to Terra."

"And this order was sent?"

"Sent and countermanded immediately."

"But?"

"The countermanding order has not yet been acknowledged. For some reason all official communication with the



colonies has broken down. But we have dispatched military detachments to each of the colonies. Insurrections, if any, will be summarily—"

"That's enough, Van Hooten. Professor Culpepper?"

"Yes?"

"Will you be good enough to tell us how this last little detail was arranged?"

Culpepper smiled and began packing his pipe. When he had finished he looked up and said:

"No."

"Well, never mind," the voice continued. "It is of no great importance. But I am distinctly curious, Dr. Culpepper, to know how you expect this momentary fiasco in the Colonial Service to set right the ills of the universe you spoke so feelingly of a moment ago. A fiasco that will cost you your life, by the way," he added genially. "Would you care to explain your foolhardiness, professor?"

"Willingly," the crusty old biologist said. "I have seen some equations that told me that the effect of my little blunder—together with certain other blunders that I did not then know about—would be just what you hear outside."

For a moment we all listened to the mumble of the awakened city beyond the window. Then the soft voice purred on:

"And these equations, professor? The spy showed you these equations?"

"The Captive," Culpepper corrected. And turning to me he grinned: "Damned if they didn't work, too!"

"Silence!" gritted the guard. From the corner of my eye I saw the nozzle of his blaster nudging Culpepper's ear.

The biologist leaned slowly back and looked at the white fury in the face of the guard. "I am an old man, son," Culpepper began quietly. "And my work is—"

The *spppt* of the blaster finished his sentence. It was set on short range. And made no mess. Culpepper's hand brushed my knee as his headless body slid gently under the table.

"Dr. Lu?" the voice said placidly.

"Yes, Imperial Presidency? I await your command." There was just the slightest tremor in the young anthropologist's voice.

I was, of course, more frightened than I had ever been in my life. I had never seen a man murdered before. And to have that man a friend and his corpse within reach of my toe, well—But I forced myself to attend to Lu's story, for in it would lie, perhaps, the clue to my own conduct—perhaps even my life.

His story was much like Culpepper's—the accusation and easy confession. Lu had instigated a plot among Asiatic civil servants. Passive resistance to Imperial demands. The withdrawal of the Asian delegation was to be the spark. Already the government was completely decentralized. Yes, he too

had seen the equations. Had, in fact, helped the Captive prepare them. And he admitted digging up the values of the hundred of sociologic variables the Captive needed to make his predictions.

"I am a social scientist, Imperial Presidency," Lu concluded. "For many years I have dreamed of such equations. Of discovering the underlying laws of humanoid association. And, like my late distinguished colleague, I have long been aware of the good uses to which such knowledge could be put. It was a great privilege to assist the Captive with his work."

He was not, of course, addressing "his Imperial Presidency" at all, but us, his friends, beside him at that grim table. But due to his careful courtesy Chin Lu kept his head and it was Blake's turn.

I was afraid for Blake. His now-famous rashness would surely deal him Culpepper's fate before he finished his first angry sentence. But with a cold scorn, that was most unusual for my hot-headed friend, he got through his "confession" with the greatest dispatch, answering the Emperor's further questions with monosyllables if at all.

Blake, curiously, had known nothing about the "equations" the others had spoken of. He had talked with the Captive, he said, about the "racial question." No, the Captive had not urged him to incite revolt among the Terran Negroes. He had merely pointed out, in answer to Blake's own questions, the inherent instability of the centuries'-old segregation policy. A push here, a shove there and the whole shabby structure would crumble. As for Blake's motive? It was simple. His year's contact with the military had focused his old hate of cruelty; two weeks contact with the dark continent had focused his love. He had gone there, he said, merely to serve. It was not until later that the idea of revolt fully ripened in him. Then? Then it was easy. The people had long been ready. The far-flung organization of the hospital research service which he headed made it possible to touch off the entire continent at once. That was all he would say and that was enough.

"And now, Professor Grant," the voice said.

I nodded and waited, resolved to play the game stubbornly.

"You are this year's President of the Imperial Association of Atomic and Gravitic Physicists and Engineers."

"That's right."

"This organization has traditionally served, with my approval, the recreational and . . . social needs of your distinguished membership, Dr. Grant. Is that not so?"

I nodded. The annual convention of IAAGPE was invariably an Empire-rocking event of drunken foolery. In my memory the organization had served no other purpose. Manazetti

had spoken sourly of our special guilt and hence our special need for group catharsis.

"Recently, however," the voice continued. "The Association has been engaged in a new activity. Messages have been interchanged among the membership with unusual frequency; ever since your return from Sirius, in fact, Professor."

"Specially big convention next month," I explained shortly.

"Yes. This has been the apparent subject of your correspondence. But—"

"But what?"

"But you, too, Grant, have been a confident of the Sirian spy!"

Ah, then they did not know! They merely suspected.

"Yes, like my friends here, I found the Captive a most entertaining conversationalist."

"You also helped him solve certain equations, I believe."

"Puzzles," I corrected happily. "He had some interesting puzzles in matrix algebra. I showed him how to work them."

"Indeed, professor. You will, of course, be shot for that. But let us come to the point. How did your conversations with the captive affect your activity in the IAAGPE?"

His voice had become a trifle unpleasant and I foolishly allowed myself a little irritation in my answer.

"Really, Mr. Smith! You don't expect me to tell you, do you? If you know, I should be a fool to lie to you. If you do not know, I should be an even bigger fool to tell you."

"Quite," the voice said gently. "Therefore, professor, I will tell you that we do know. That we know enough to have taken the entire membership of the IAAGPE into custody. As you left your office this afternoon your entire staff was arrested. And from Sol to Sirius there is not a physicist or technician at large. You see, Professor Grant, there were not so many of you that we could not take . . . shall I say, precautions?"

I will have to admit that I was, for a moment, taken aback. A young assistant of mine, a splendid girl, was to have been married in the morning.

"I see," I said. And let it go at that.

"If you choose not to tell us, Professor Grant, the details of your plans with the Sirian spy, it is quite within our power to liquidate the entire profession."

I laughed at this.

"And do you really think that you could run the Empire without physical science, Mr. Smith? Without gravitic power? Without atomic armaments? Without communication? Really, old fellow, your threat is just a bit unreal!"

"We should not, of course, be so foolish as to kill you all at once," he smiled. "And we would, of course, stop killing you as soon as you—or anyone, for that matter—gives us the information we require. Do not mistake us for butchers, Dr. Grant."

"And if I—or anyone—does *not*

confess, Mr. Smith? Or if, confessing to save our necks, we refuse to cooperate any further in running your Empire for you . . . what of my question then?"

"We will train new, loyal technicians to operate our physical plant."

"And who would teach them?"

"There are books, professor. You have not burned the books, I trust?"

I grinned back at him. "Tell me, Imperial Presidency, have you ever tried to read one of those books? On transtemporal subnuclear gravitics, say?"

The wrinkled head turned slowly on its fragile neck and peered thoughtfully at the Chief of Imperial Police.

"The professor is toying with us, Malinowski. Have the Sirian spy brought in. And, oh yes, prepare Dr. Thomas Manazetti. We may need him soon." And turning back to me: "Dr. Grant will be delighted to see his old friend again."

They wheeled the Captive in. He was sitting in a hospital chair, his once-lithe body huddled strangely under a sheetlike garment. Two armed attendants in the white, starched uniforms of the medical corps pushed him to a spot just in front of the tall window where the rumble grew with every minute. I allowed myself one brief glance and the hint of a smile and then stared studiously at my folded hands.

In that glance I had seen enough to stiffen the somewhat wobbly resolution of an hour before. For the sheet covered but did not hide a half dozen boxlike lumps on the Captive's limbs and torso that could mean only one thing: visceral extrusion, a medical research technique developed and abandoned some twenty years before. Except for use on volunteer condemned criminals, I corrected silently.

Rising hideously from the Captive's shaved white skull was the one visible example of this unholy but tremendously effective technique: guyed securely in a steel and plastic brace holding his neck and shoulders immobile, slender silver rods supported an ascending series of silver trays. On these trays, in ghastly array, lay the Captive's brains, ingeniously extracted from the yawning hole atop his shaven skull and laid out carefully under glass —for observation, and experimentation.

I must have shuddered a little for I felt Blake's hand on my arm.

"Easy does it, Grant. It doesn't hurt, y'know."

I nodded and heard the voice saying softly, as if from a great distance:

"Rest assured, gentlemen, that the Sirian spy is still in full possession of his . . . rather remarkable faculties. And it pleases me to report that more loyal technicians than you, gentlemen, have discovered the secret of the Sirian gravicity gland. And how to counteract it. A fleet especially equipped with dampening transmitters is on its way

to Sirius-A at this moment."

I stole a second look at the Captive. Under his hideous harness his eyes were smiling at us.

"Does that displease you, Dr. Grant?" the voice continued. "For if it does not, we have still other proofs of the failure of the cause you so foolishly fought for. Professor Grant!" the voice insisted.

Then quietly, steadily, from the all-but-disemboweled carcass in the wheel chair came the familiar musical tones of the Captive's voice:

"Be still, old man. You have asked many questions. Now, I shall answer them. But I wish first to talk with my friends. You have, as I suggested, brought them here. That is good. Now, only be quiet and you will learn what you wish to know. About my people and our plans for you."

The big head at the end of the table quivered and then subsided. And with it, as if controlled by it, the arms of the two gunmen behind us also quivered and subsided.

"Proceed, spy."

"Professor Grant. Chin Lu. And the volatile Blake," the Captive said, looking at each of us in turn. "It is good to see you all once more. But where is Culpepper? And Manazetti?"

We told him about Culpepper.

He nodded. "He was too happy to fear them. But Manazetti?"

"They're bringing him later," I said.

"Yes. They would save him," he said. "Until the last." His gray eyes flickered for a moment before he went on. "But we have done our jobs well, have we not, my friends? The unrest grows hourly. But do not let it disturb you. The awakened passions of your people will turn as quickly to peace—within three days, I should judge. With us or without us," he smiled.

"While there is time, therefore, let me answer your unspoken questions. Let me fill out the half-truths and unravel the lies I have been forced to tell you about my people and myself. You have guessed much, of course, but there is much, much more to tell. Bear with me."

We settled back, great-head and his four brassy-eyed lieutenants forgotten, and listened.

"Let me begin with myself," the Captive said. "Among my people I am not, as I informed you, a dancer. I am a designer, an inventor. I suppose you would call me an 'engineer.' But the materials which I deal with are not physical, as among your engineers, but social. They are the habits, customs, values of my people — with whom and for whom I worked. Not without some small success.

"Among my people such social engineers as myself are commonplace—as common as doctors or physical engineers among you. And in our designs and inventions—even our occasional repairs—we follow closely the work of our great scholars, just as your engi-

neers follow the basic work of men like Grant, here. But among us scholarship has a different bent. For many millennia the intelligence of our race has been focused inward by our environment, even as yours has been turned outward by the stars. And for as long as we have known science it has been a science of what you would call bio-social and perhaps, psychological phenomena. As with you, this focusing and gradual accretion of intelligence has been rewarded; we have made many mighty discoveries concerning social forms and processes, until now we are in possession of the basic laws which govern all human, and perhaps, all humanoid, association. Just as your scientists have unlocked the secret of the atom, and hence all matter, our scientists, have unlocked the secret of all individual attraction and repulsion, and hence all societies.

"As a result of applying these discoveries to ourselves, over the centuries, social and personal life among us has become as stable, satisfying, and essentially as efficient as one of your ingenious physical machines. In a word, we have erected a social structure that works.

"We are not, of course, entirely without the trauma, pain, and conflict that is so rampant among you Terrans. We are not utopian, nor do we want to be. Even less do we claim that the simple social forms we have developed from our own peculiar genes on our own peculiar planet is best for all humanoid life, everywhere. But our social life works very handsomely for us. And what trauma, frustration, and conflict we do experience is contributory to the development of the harmonious personality, not destructive of him. Consequently, it was with no little disturbance that we observed the pathetic symptoms of blustering cruelty and blind authoritarianism among your people when they swarmed down out of the cloud upon us in their beautiful machines.

"We did not relish exposing the delicate equilibrium of our social forms to brute forces entirely outside our control. Nor did we fancy being enslaved by a horde of wonderfully clever but incredibly childish mechanics. And I am sorry, but this, you see, was what you seemed to us to be."

He paused for a moment and looked at us. To discover whether he had offended us, I suppose. Finding nothing worthy of comment or apology the Captive went on.

"The threat of your really quite awesome weapons, disturbed us at first. But then we discovered, wholly by inference, the rather ingenuous formula by which you guided those weapons. What your soldiers call 'military strategy'. From that time onward our most skillful engineers manipulated the thought-patterns of your commanders simply by keeping your behavior contingent on our own. Thus, although quite weaponless, with a few small sacrifices we were

able to preclude your plans of conquest.

"At that time, perhaps one week after your original landings, we devised a plan of our own. A plan of conquest, if you like, for there seemed no alternative but to do battle with you. Though not, of course, on your own terms, nor with your weapons. Our weapons, as you have already guessed, were social. And I was one of them.

"A social saboteur was needed. And, moreover, a saboteur who could work in a social milieu that was entirely foreign to us. Among several hundred volunteers—scholars, inventors, and engineers—I was selected. I suppose for the bizarre designs and social arabesques for which I had become rather well known in the profession. It was to be my job to destroy, if necessary; to renovate, if possible; or to render at least harmless, the social system which threatened us. It was a tricky and exciting assignment and I was, I suppose, the most envied one of my profession when I slept through the alarm that day in the fifteenth village you attacked."

The Captive paused for a moment and smiled. I could not resist asking:

"But weren't you appalled, man, at the terrific responsibility that devolved on you? After all, the safety—perhaps even the survival—of your entire race lay pretty much with you."

"Not at all, Grant," the Captive answered. "The fate of *your* people lay with me. The fate of mine were in the sober, vastly more competent hands of the thousands of skilled scientists who were to study and inculcate our captives. You see we could not depend on just one weapon. We meant to have thirty thousand others. Thirty thousand Terran marines. Through them, no matter how I failed or succeeded, our own people would at least be free of you forever. You see, they were to be recalled, as I remember the plan, and once on Terra—" His voice trailed off and glancing sharply up the long table, asked: "I assume that this has been done?"

"Nonsense!" the Chief of Defense exploded. He had evidently been wanting to say it for a long time. "Sirius-A will fall within the week! Your own glands, spy, have shown us how to deal with your people!"

"You do not know, then, that your own fleet, has been overpowered? That it is now manned and commanded by the Terran soldiers we captured and indoctrinated for forty successive days? That it is now on its way to Terra?"

There was a moment's absolute silence during which you could almost hear the military mind grinding.

"Nonsense," Carlsen said again, but cautiously. "Of course, they are on their way. And by my order."

"Suitably predicted," the Captive smiled and turned back to us. "You see, Grant, my responsibility to my *own* people was not so very great after

all. These trained soldiers of yours are prepared to capture and disarm Terra and patrol it for a decade. Unless—"

The Chief of Defense was now on his feet and shouting something at the Captive about the impregnability of Terra's defenses. But I knew a little more about those defenses than poor Carlsen knew and I was more interested in the Captive's "unless."

"Unless what?" I asked somewhat uneasily.

"Unless you and I, Grant, and our three friends, here, have succeeded in our task—as I think we have." He listened intently to the sounds outside the window, as if to gauge their intensity. "Yes," he murmured, "I think we have."

"Then it was your task, Captive," Chin Lu said slowly. "To save us for ourselves. While if you failed—?"

"Your own fleet. And Grant, here, would have pulled your rather nasty teeth. You see—"

I sat back, relieved. Then the sound of the voice, this long time silent, interrupted the Captive.

"Professor Grant," it purred. But there was a new note in it, as of slow strangling.

"Yes, Mr. Smith," I answered, not unkindly.

"Will you tell me what your Association of Physicists has done to us?"

"Certainly, sir. I see, now, that there can be no great harm—"

"Tell me!"

"Why, only that we have disarmed all radioactives. All atomic and gravitic weapons have been rewired so that they are at present inoperative. And so that they cannot again be tampered with without exploding."

"All?" he asked.

"All. In every ship and ammo dump from Sol to Sirius, sir, the radioactives are utterly useless. There are weekly inspections, you know," I explained kindly. "Only qualified personnel. It was a simple task to arrange, you see. But I'm afraid it will be mighty difficult to undo." I tried very hard not to grin at him, but a wee smile did break through.

But it didn't matter. Thin parchment lids were sliding down over the ancient eyes.

"I see," he said.

And I really think he did.

But not Carlsen. The big man was on his feet again and raging.

"Look here, Grant! If you're telling the truth I'll have every scientist's head rolling by morning! I'll court-martial every ordnance officer in the fleet! I'll—"

"Sit down, Carlsen," the Emperor-President said wearily.

In the silence, Chin Lu remembered his question.

"You were telling us, Captive, that it was to be your job to save us for ourselves—"

"If possible," the Captive corrected.

"To learn about us, the sources of our—what you have called, infantile

behavior—and if possible, to invent and suggest remedies that would attack these troubles at the roots?"

"That's roughly what I set out to do, Chin. But I soon found that the hopeful, re-creative forces in your society had become so hopelessly bound up in the static and even degenerative forces that I saw that it would be necessary to level, so to speak, the superstructure of your culture in order to free the positive forces latent in it. Do I make myself clear? Your language, I fear does not lend itself to an exact, scientific exposition of these processes."

"I think I see what you mean. Go on."

"Well, after many weeks of careful analysis I located the weak spots in this superstructure. You, Chin, knew of one. Blake, another. Culpepper, a third. You will observe that they were all three in the authority-system of the Terran society, its weakest dimension. The combined effect of your three pushes in these sectors should reduce the 'Empire' to a state of apparent 'chaos' in a dozen hours social time. Then, and only then, can the creative forces emerge. And from the sound of things, social time is running fast." His eyes flicked to the draperied window behind him.

For a moment we all listened. Then, addressing itself to the Emperor-President, the Captive's voice continued, low against the muted howling of the crowds outside.

"You see, old man, the mighty state of which you have long been the honored head was, at bottom, as fragile as a house of paper. By your strength of will and through the desperate support of a few small groups within the population—principally the men of money and the military—this house was held together, long after it should have collapsed from the creaking anachronism of its several members. But its foundations were rotten. It was built with blind hope on footings of human terror and misery. And in the great shocking inconsistencies and contradictions between its warring parts, this house has left its mark upon the most fortunate who live in it. For the sensitive man there is little beyond shame and guilt to be found in it. For the man of energy and ambition, there is first the ceaseless frustration of large goals denied, later the inevitable pursuit of the hollow goals: money, fame, luxury, or power—that make a mockery of ambition. For the strong, there is only the shame of easy victory. For the weak, only terror. For the stupid, unspeakable drudgery. For the intelligent, the perversion of wit to witless ends. And for the slaves—the humans who live in the hundred kinds of bondage your blind urge to Progress has invented, except a small handful of native, white, male Terrans who found a kind of dignity in their birthright—life in this paper house of yours was a parade of little hurts of deep indignities, denying to nine-tenths of human

nature what it, like all life, most craves: the dignity of self-possession. Your house is falling, old man. Human nature deserves a sounder, fairer structure in its place."

Christopher Smith opened his eyes and peered silently down the long table at the misshapen gray figure in the wheel chair. Then he cocked his great head a trifle as if to listen. For a moment the sounds outside the great window had died down.

"You speak very eloquently, Mr. Captive. I wonder that you know so much about us."

He placed his hands on the table as if to rise. The two guards jumped to his sides. He hesitated a moment, then, waving them away, he turned once more to face us. His face gleamed oddly.

"There is just one more thing, gentlemen," he said with his old, sure softness. "The case of Professor of Psychology, Manazetti. Bring the professor in, boys."

Eagerly, I turned in my chair to face the door. I was not prepared for the sight that greeted me as the guard swung it open.

Braced on the arms of two hospital attendants, arms bound to his sides in the sleeves of a strait jacket, eyes haggard and chin rhythmically quivering, stood Tom Manazetti. The tunnel openings that were his eyes reached out for mine and he said:

"Well, well. If it isn't old Atomics Grant—"

He lunged for me and if the alert attendants had not caught him he would have fallen into my lap. I was on my feet and shouting, I think, at the implacable Mr. Smith before they had Tom on his feet again.

"What is the meaning of this, sir? What have you done to him?"

Grinning slyly the death's-head answered calmly.

"We found the professor in a Venusian asylum for the criminally insane, Dr. Grant. You might ask your Sirian friend how he got there."

Bewildered I turned to face the Captive. He had risen from his wheel chair, with what effort I do not know, and was staring silently at the beaten Manazetti. There was a look of anguish on his face and for a long moment he ignored my pleading stare. Then he turned to me, to all of us, for Chin Lu and Blake had risen beside me, and said:

"This is the final chapter of my story, friends. I will tell you, now, why you did what you did and why you will continue to do what you will do. And"—his voice became almost inaudibly soft—"why Tom Manazetti is what he is."

His almost empty body seemed to sag a little and he reached with one slim, gray hand for the table's edge. Though I could not take my gaze from the Captive's face, out of the corner of my eye I saw Manazetti, erect now, in the arms of his attendants, but staring at the Captive with open hatred written across his face. Steadying himself, the Captive continued in the old, bell-like voice:

"You know now, my friends, of my skill—no, my people's skill—in sociology. But we are also, by your standards, master psychologists. I am not trained in his field. Still, like all my people, I know something of the art of persuasion. It was, as you know, my task to persuade you of the rightness of my cause. To enlist you in the fight for your own maturity. But I did more than that. In effect, I forced you to do what you have done. No," he raised his hand against the surprise sweeping across our faces. "No, it was not hypnosis. Far deeper and surer than mere hypnosis was the technique I used. I located in each of you three—and in the gallant Culpepper—the dominant motive, the mainsprings of your personalities. And then I hitched this motive to the job I—*and* you—wanted done.

"In you, Blake, I found it simply and directly. Since a childhood spent with a suffering invalid mother, you have hated pain with a depth that was, and is still, overpowering. By way of adjustment you had found a way-of-life, in scholarship, that kept you out of suffering's view. But—and this, you others must have noticed in him—the slightest hint of suffering intruding this quiet world of his would transform him utterly from the pacific, quiet-spoken man he ordinarily was to a wild-eyed crusader. I had merely to

send you, Blake, to the miserable continent and the rest was inevitable.

"In Culpepper, it was not so simple. A good man, with a good man's weak stomach for evil, he was nevertheless so perfectly adjusted to his chosen life that for a while I despaired of unseating him from it. But at last I uncovered the motive that would pry him loose. He had, you remember, the biologist's fascination with life. It was his profound conviction that each life form had its separate destiny, that no man ought to tamper with this destiny. I inquired a little further and discovered, as you might expect, that Terra's brutal treatment of subject races in all parts of the universe had offended him deeply. So deeply that he found it difficult to talk about. Accordingly, I examined with him the sociologic consequences of upsetting the colonial service and finding them auspicious, sent him off. As a scientist he was, of course, quite fascinated with my formulae, and this was a secondary motive—he wanted to know if they would work. Finally, being a completely fearless man the adventure held no threat for him. And would not, I imagine, even had he known its bitter end.

"With Chin Lu, here, the motive was quite unsuspected. He is obviously, of course, a social scientist and possessed of his fair share of the social scientist's deep longing—particularly defensive among you who have no real social science—to bring power and nicety into his backward discipline. But the astonishing thing about Chin was that he wanted nothing else. I had learned to look for deep, obsessive motives among you Terrans, hidden chains upon your reason. But in Chin, all was as it seemed to be. He has lived in your fractured world and remained whole. Once I discovered this about him, my job was done. I simply talked to him as if he had been a rather bright Sirian schoolboy. He learned very quickly and was, of course, agreeable to everything I suggested. Asia was selected for the scene of his operations simply because he could work with Asia. He did very well. May I suggest that Chin Lu be regarded as the first Terran social engineer?"

He looked fondly at the young anthropologist for a moment and turned to me.

"Grant," he said, with a faint smile, "did the most magnificent job of all. And the simplest, from my point of view, to arrange. In you, as you yourself know so very well, motive was a simple matter of your ancient wish to free yourself from the guilt you thought you carried. A guilt which you shoulder, with quite unnecessary generosity, I assure you, for your whole profession. And one which you have now erased almost singlehandedly. You see, gentlemen, Grant was his own inventor, here. In the field of physics I am, as you know, too ignorant to be a designer of effective sabotage. But

Grant, who had often toyed with the idea of non-co-operation with the military—whom he had unwillingly served, either directly or indirectly, throughout his entire professional career—Grant, I say, needed only to be assured that this was the *time* to unload his guilt. The *way* it could be done was clear enough to him. Quite in the spirit of hypothesis, then, Grant and I solved a few predictive equations as to the effects of general physical sabotage on the social world at this time. I could see he was intrigued with my predictions and I let it go at that. You know the rest.

"Now, Manazetti—" he began. And then fell silent. There was a look of panic in his eyes as they flashed from face to face. Poor fellow! I believe it was the first time in his serene life that he had felt the tearing wounds of internal conflict. He struggled visably for a moment and then began again.

"Manazetti was the most knowing Terran of you all. Almost from the very moment I talked with him, I sensed his deep insight and—yes, suspicion—of me. He knew, you see, what no one else would believe. That unarmed and alone though I was, I was—or could be—master of you all.

"Tom didn't want to be mastered. I struggled to find in him a motive that would bring his keen mind and boundless energy over to our side. But all I found in Tom was a deep, empty, pathetic insecurity that was entirely new to me. He was afraid of everything and everybody, most of all, himself. There was no out-going motive, no wish to save, or cure, or help. Fear and self-defense were the dominant themes of his personality. So there was nothing to tie my message to. Nothing. And, though I could not be sure that he meant us any harm, he knew too much about our plans. I began to look around for a way to keep him occupied for one month's time."

The Captive was looking down, now, at his slender hands. His voice sounded, once or twice, as if it were about to break. But it did not and he went on.

"I tried money, sex, power. None of these caught on. I tried to think of some simple crime that I could lead him to. But he wanted nothing, except security, which he felt he had. Then one day I discovered an old hate, deep within him. A boyhood friend, now married and living, he thought, as a trader on Venus, had done him some great injustice. I do not remember the details, except that it involved a girl. I was amazed to learn, that as we talked about this ancient hurt, all of Tom's fears seemed to hinge on this event. Scarcely knowing what I did—for we on Sirius-A know nothing of psychosis—I felt that here was something that might keep Tom occupied for a month or more, and I aggravated the tension of his hate for this man by every psychological trick I knew. When we landed on Terra I was satisfied with the job I had done. Tom lived in a phantasy world of revenge."

The Captive took a very deep breath. Then he finished:

"I do not know what I expected him to do. Search out and insult his old friend, perhaps. I even considered the possibility that he might strike him. But I did not know that he could—kill."

I could not bring myself to speak. Beside me, Blake asked shortly:

"You turned him into a killer?"

The Captive nodded.

One of the attendants, dropped Tom's arm to light a cigarette, and getting our attention, said casually, nastily, out of the corner of his mouth:

"He killed five people. This other guy and his wife and three kids."

There was a grunt, the sudden pound of feet and I felt rather than saw Tom's hurtling, canvas-clad shoulder smash into the slender, lumpy figure of the Captive. There was a tinkle of silver and breaking glass and the empty gray pelt bent softly to the floor. His viscera, unshelved, lay all around him.

Looking at these curious objects on the floor and then at Tom, quiet-eyed now with his murder, I heard the Captive's voice stirring in my memory:

". . . And they fight. In youth, when pride is precious and unproved, for the dignity of self-possession."

Tom possessed himself. Now.

There was an angry mass shout at the window, louder, now, than before.

Blake was walking across the room. Half-dazed but curious I watched him. Now, he was stepping over the Captive's scattered body. Now, to the tall window and throwing back the heavy drape. He opened it. Half-attentive, I listened to his voice cutting into the tumult outside:

"The Emperor-President has resigned. Africa will be healed. Tomorrow there will be an Empire-wide referendum. The colonial peoples will participate. The Sirian war is over. Now, go home and think about the kind of world you want to live in."

He said each short sentence very loudly and very slowly, with long spaces in between. Blake then shut the window, and pulling back the drape, stood motionless.

After a long while there was a murmur behind me. Then I heard the voice of the Emperor say:

"Go home, Abercrombie. All of you, go home. You heard the professor."

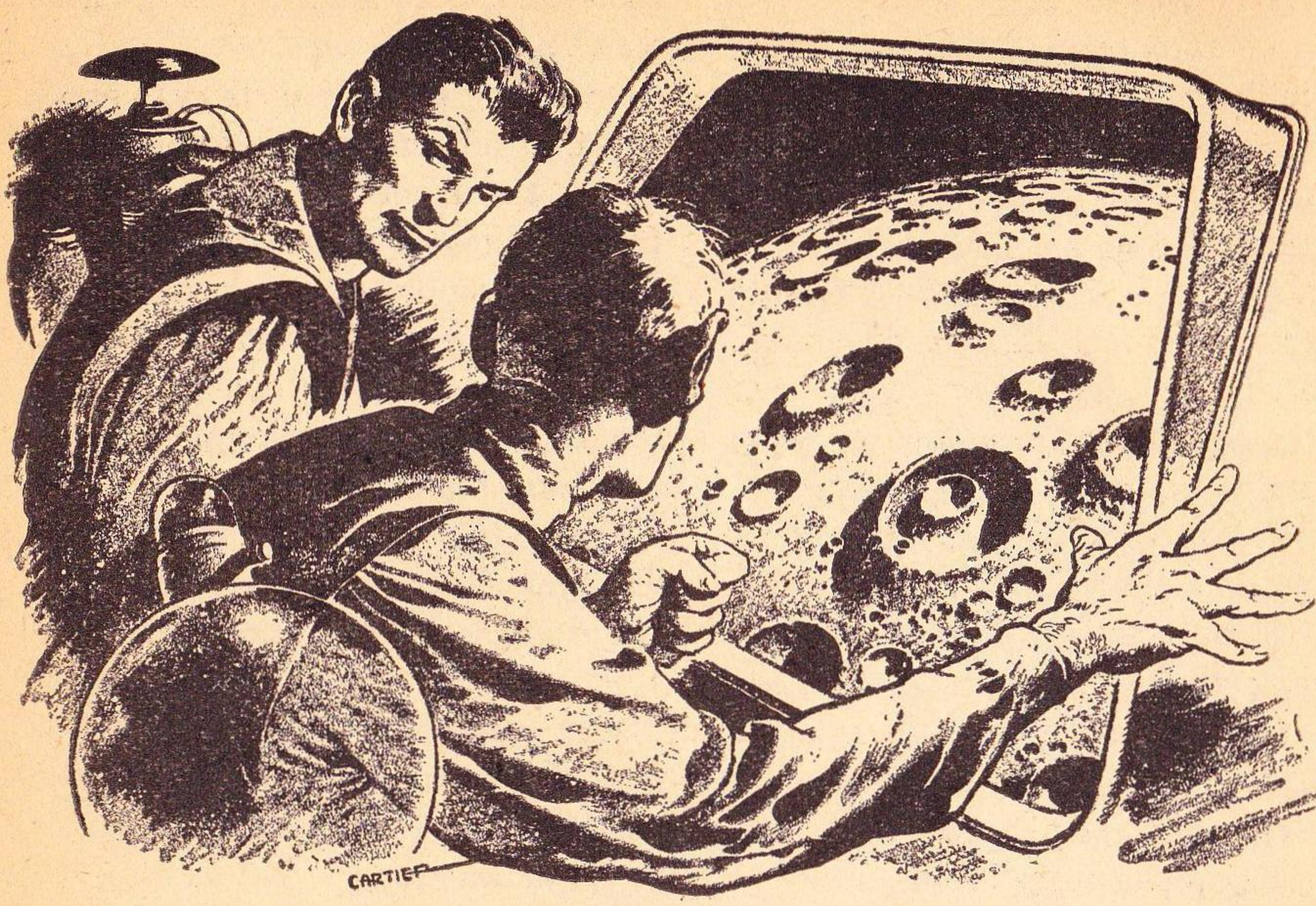
They went.

Manazetti left with his keepers, still peaceful-eyed.

The hospital attendants made a stab at gathering up the Captive on his several trays. I growled something and they left by the same door.

Finally, we were alone. The death's-head at the end of the long empty table and I. And together we listened. Silently listened to the faint, dying jubilance outside. And to the bell-shaped echoes graven on the walls.

THE END



There is one circumstance under which it is exceedingly difficult to establish communication with another individual —or race. A new author considers a point that could make technically adequate communications quite futile . . .

Great were the Antha, so reads the One Book of History, greater perhaps than any of the Galactic Peoples, and they were brilliant and fair, and their reign was long, and in all things they were great and proud, even in the manner of their dying—

Preface to Loab: History of The Master Race

The huge red ball of a sun hung glowing upon the screen.

Jansen adjusted the traversing knob, his face tensed and weary. The sun swung off the screen to the right, was replaced by the live black of space and the million speckled lights of the farther stars. A moment later the sun glided silently back across the screen and went off at the left. Again there was nothing but space and the stars.

ALL THE WAY BACK

"Try it again?" Cohn asked.

Jansen mumbled: "No. No use," and he swore heavily. "Nothing. Always nothing. Never a blessed thing."

Cohn repressed a sigh, began to adjust the controls.

In both of their minds was the single, bitter thought that there would be only one more time, and then they would go home. And it was a long way to come to go home with nothing.

When the controls were set there was nothing left to do. The two men walked slowly aft to the freeze room. Climbing up painfully on to the flat steel of the beds, they lay back and waited for the mechanism to function, for the freeze to begin.

Turned in her course, the spaceship bore off into the open emptiness. Her ports were thrown open, she was gathering speed as she moved away from the huge red star.

The object was sighted upon the last leg of the patrol, as the huge ship of the Galactic Scouts came across the edge of the Great Desert of the Rim, swinging wide in a long slow curve. It was there on the massometer as a faint *blip*, and, of course, the word went directly to Roymer.

"Report," he said briefly, and Lieutenant Goladan—a young and somewhat pompous Higiandrian—gave the Higiandrian equivalent of a cough and then reported.

"Observe," said Lieutenant Goladan, "that it is not a meteor, for the speed of it is much too great."

Roymer nodded patiently.

"And again, the speed is decreasing"—Goladan consulted his figures—"at the rate of twenty-four dines per segment. Since the orbit appears to bear directly upon the star Mina, and the decrease in speed is of a certain arbitrary origin, we must conclude that the object is a spaceship."

Roymer smiled.

"Very good, lieutenant." Like a tiny nova, Goladan began to glow and expand.

A good man, thought Roymer tolerantly, his is a race of good men. They have been two million years in achieving space flight; a certain adolescence is to be expected.

"Would you call Mind-Search, please?" Roymer asked.

Goladan sped away, to return almost immediately with the heavy-headed nonhuman Trian, chief of the Mind-Search Section.

Trian cocked an eyelike thing at Roymer, with grave inquiry.

"Yes, commander?"

The thought message popped clearly into Roymer's mind. Those of Trian's race had no vocal apparatus. In the aeon-long history of their race it had never been needed.

"Would you stand by please?" said Roymer, and he pressed a button

BY MICHAEL SHAARA

and spoke to the engaging crew. "Prepare for alien contact."

The abrupt change in course was noticeable only on the viewplate, as the stars slid silently by. The patrol vessel veered off, swinging around and into the desert, settled into a parallel course with the strange new craft, keeping a discreet distance of—approximately—a light-year.

The scanners brought the object into immediate focus, and Goladan grinned with pleasure. A spaceship, yes. Alien, too. Undoubtedly a primitive race. He voiced these thoughts to Roymer.

"Yes," the commander said, staring at the strange, small, projectilelike craft. "Primitive type. It is to be wondered what they are doing in the desert."

Goladan assumed an expression of intense curiosity.

"Trian," said Roymer pleasantly, "would you contact?"

The huge head bobbed up and down once and then stared into the screen. There was a moment of profound silence. Then Trian turned back to stare at Roymer, and there was a distinctly human expression of surprise in his eyelike things.

"Nothing," came the thought. "I can detect no presence at all."

Roymer raised an eyebrow.

"Is there a barrier?"

"No"—Trian had turned to gaze back into the screen—"a barrier I could detect. But there is nothing at all. There is no sentient activity on board that vessel."

Trian's word had to be taken, of course, and Roymer was disappointed. A spaceship empty of life—Roymer shrugged. A derelict, then. But why the decreasing speed? Pre-set controls would account for that, of course, but why? Certainly, if one abandoned a ship, one would not arrange for it to—

He was interrupted by Trian's thought:

"Excuse me, but there is nothing. May I return to my quarters?"

Roymer nodded and thanked him, and Trian went ponderously away. Goladan said:

"Shall we prepare to board it, sir?"

"Yes."

And then Goladan was gone to give his proud orders.

Roymer continued to stare at the primitive vessel which hung on the plate. Curious. It was very interesting, always, to come upon derelict ships. The stories that were told, the silent tombs that had been drifting, perhaps, for millions of years in the deep sea of space. In the beginning Roymer had hoped that the ship would be manned, and alien, but—nowadays, contact with an isolated race was rare, extremely rare. It was not to be hoped for, and he would be content with this, this undoubtedly empty, ancient ship.

And then, to Roymer's complete surprise, the ship at which he was staring shifted abruptly, turned on its

axis, and flashed off like a live thing upon a new course.

When the defrosters activated and woke him up, Jansen lay for a while upon the steel table, blinking. As always with the freeze, it was difficult to tell at first whether anything had actually happened. It was like a quick blink and no more, and then you were lying, feeling exactly the same, thinking the same thoughts even, and if there was anything at all different it was maybe that you were a little numb. And yet in the blink time took a great leap, and the months went by like—Jansen smiled—like fenceposts.

He raised a languid eye to the red bulb in the ceiling. Out. He sighed. The freeze had come and gone. He felt vaguely cheated, reflected that this time, before the freeze, he would take a little nap.

He climbed down from the table, noted that Cohn had already gone to the control room. He adjusted himself to the thought that they were approaching a new sun, and it came back to him suddenly that this would be the last one, now they would go home.

Well then, let this one have planets. To have come all this way, to have been gone from home for eleven years, and yet to find nothing—

He was jerked out of the old feeling of despair by a lurch of the ship. That would be Cohn taking her off the auto. And now, he thought, we will go in and run out the telescope and have a look, and there won't be a thing.

Wearily, he clumped off over the iron deck, going up to the control room. He had no hope left now, and he had been so hopeful at the beginning. As they are all hopeful, he thought, as they have been hoping now for three hundred years. And they will go on hoping, for a little while, and then men will become hard to get, even with the freeze, and then the starships won't go out any more. And Man will be doomed to the System for the rest of his days.

Therefore, he asked humbly, silently, let this one have planets.

Up in the dome of the control cabin, Cohn was bent over the panel, pouring power into the board. He looked up, nodded briefly as Jansen came in. It seemed to both of them that they had been apart for five minutes.

"Are they all hot yet?" asked Jansen.

"No, not yet."

The ship had been in deep space with her ports thrown open. Absolute cold had come in and gone to the core of her, and it was always a while before the ship was reclaimed and her instruments warmed. Even now there was a sharp chill in the air of the cabin.

Jansen sat down idly, rubbing his arms.

"Last time around, I guess."

"Yes," said Cohn, and added laconically, "I wish Weizsäcker was here."

Jansen grinned. Weizsäcker, poor old Weizsäcker. He was long dead and it was a good thing, for he was the most maligned human being in the System.

For a hundred years his theory on the birth of planets, that every sun necessarily gave birth to a satellite family, had been an accepted part of the knowledge of Man. And then, of course, there had come space flight.

Jansen chuckled wryly. Lucky man, Weizsäcker. Now, two hundred years and a thousand stars later, there had been discovered just four planets. Alpha Centauri had one: a barren, ice-crusted mote no larger than the Moon; and Pollux had three, all dead lumps of cold rock and iron. None of the other stars had any at all. Yes, it would have been a great blow to Weizsäcker.

A hum of current broke into Jansen's thought as the telescope was run out. There was a sudden beginning of light upon the screen.

In spite of himself and the wry, hopeless feeling that had been in him, Jansen arose quickly, with a thin trickle of nervousness in his arms. There is always a chance, he thought, after all, there is always a chance. We have only been to a thousand suns, and in the Galaxy a thousand suns are not anything at all. So there is always a chance.

Cohn, calm and methodical, was manning the radar.

Gradually, condensing upon the center of the screen, the image of the star took shape. It hung at last, huge and yellow and flaming with an awful brilliance, and the prominences of the rim made the vast circle uneven. Because the ship was close and the filter was in, the stars of the background were invisible, and there was nothing but the one great sun.

Jansen began to adjust for observation.

The observation was brief.

They paused for a moment before beginning the tests, gazing upon the face of the alien sun. The first of their race to be here and to see, they were caught up for a time in the ancient, deep thrill of space and the unknown Universe.

They watched, and into the field of their vision, breaking in slowly upon the glaring edge of the sun's disk, there came a small black ball. It moved steadily away from the edge, in toward the center of the sun. It was unquestionably a planet in transit.

When the alien ship moved, Roymer was considerably rattled.

One does not question Mind-Search, he knew, and so there could not be any living thing aboard that ship. Therefore, the ship's movement could be regarded only as a peculiar aberration in the still-functioning drive. Certainly, he thought, and peace re-

turned to his mind.

But it did pose an uncomfortable problem. Boarding that ship would be no easy matter, not if the thing was inclined to go hopping away like that, with no warning. There were two hundred years of conditioning in Roymer, it would be impossible for him to put either his ship or his crew into an unnecessarily dangerous position. And wavery, erratic spaceships could undoubtedly be classified as dangerous.

Therefore, the ship would have to be disabled.

Regretfully, he connected with Fire Control, put the operation into the hands of the Firecon officer, and settled back to observe the results of the action against the strange craft.

And the alien moved again.

Not suddenly, as before, but deliberately now, the thing turned once more from its course, and its speed decreased even more rapidly. It was still moving in upon Mina, but now its orbit was tangential and no longer direct. As Roymer watched the ship come about, he turned up the magnification for a larger view, checked the automatic readings on the board below the screen. And his eyes were suddenly directed to a small, conical projection which had begun to rise up out of the ship, which rose for a short distance and stopped, pointed in on the orbit towards Mina at the center.

Roymer was bewildered, but he acted immediately. Firecon was halted, all protective screens were reestablished, and the patrol ship backtracked quickly into the protection of deep space.

There was no question in Roymer's mind that the movements of the alien had been directed by a living intelligence, and not by any mechanical means. There was also no doubt in Roymer's mind that there was no living being on board that ship. The problem was acute.

Roymer felt the scalp of his hairless head beginning to crawl. In the history of the galaxy, there had been discovered but five nonhuman races, yet never a race which did not betray its existence by the telepathic nature of its thinking. Roymer could not conceive of a people so alien that even the fundamental structure of their thought process was entirely different from the Galactics.

Extra-Galactics? He observed the ship closely and shook his head. No. Not an extra-Galactic ship certainly, much too primitive a type.

Extraspatial? His scalp crawled again.

Completely at a loss as to what to do, Roymer again contacted Mind-Search and requested that Trian be sent to him immediately.

Trian was preceded by a puzzled Goladan. The orders to alien contact, then to Firecon, and finally for a quick retreat, had affected the lieutenant deeply. He was a man accustomed to a strictly logical and somewhat

ponderous course of events. He waited expectantly for some explanation to come from his usually serene commander.

Roymer, however, was busily occupied in tracking the alien's new course. An orbit about Mina, Roymer observed, with that conical projection laid on the star; a device of war; or some type of measuring instrument?

The stolid Trian appeared—walking would not quite describe how—and was requested to make another attempt at contact with the alien. He replied with his usual eerie silence and in a moment, when he turned back to Roymer, there was surprise in the transmitted thought.

"I cannot understand. There is life there now."

Roymer was relieved, but Goladan was blinking.

Trian went on, turning again to gaze at the screen.

"It is very remarkable. There are two life-beings. Human-type race. Their presence is very clear, they are" —he paused briefly—"explorers, it appears. But they were not there before. It is extremely unnerving."

So it is, Roymer agreed. He asked quickly:

"Are they aware of us?"

"No. They are directing their attention on the star. Shall I contact?"

"No. Not yet. We will observe them first."

The alien ship floated upon the screen before them, moving in slow orbit about the star Mina.

Seven. There were seven of them. Seven planets, and three at least had atmospheres, and two might even be inhabitable. Jansen was so excited he was hopping around the control room. Cohn did nothing but grin widely with a wondrous joy, and the two of them repeatedly shook hands and gloated.

"Seven!" roared Jansen. "Old lucky seven!"

Quickly then, and with extreme nervousness, they ran spectrograph analyses of each of those seven fascinating worlds. They began with the central planets, in the favorable temperature belt where life conditions would be most likely to exist, and they worked outwards.

For reasons which were as much sentimental as they were practical, they started with the third planet of this fruitful sun. There was a thin atmosphere, fainter even then that of Mars, and no oxygen. Silently they went on to the fourth. It was cold and heavy, perhaps twice as large as Earth, had a thick envelope of noxious gases. They saw with growing fear that there was no hope there, and they turned quickly inwards toward the warmer area nearer the sun.

On the second planet—as Jansen put it—they hit the jackpot.

A warm, green world it was, of an Earthlike size and atmosphere; oxygen and water vapor lines showed strong and clear in the analysis.

"This looks like it," said Jansen, grinning again.

Cohn nodded, left the screen and went over to man the navigating instruments.

"Let's go down and take a look."

"Radio check first." It was the proper procedure. Jansen had gone over it in his mind a thousand times. He clicked on the receiver, waited for the tubes to function, and then scanned for contact. As they moved in toward the new planet he listened intently, trying all lengths, waiting for any sound at all. There was nothing but the rasping static of open space.

"Well," he said finally, as the green planet grew large upon the screen, "if there's any race there, it doesn't have radio."

Cohn showed his relief.

"Could be a young civilization."

"Or one so ancient and advanced that it doesn't *need* radio."

Jansen refused to let his deep joy be dampened. It was impossible to know what would be there. Now it was just as it had been three hundred years ago, when the first Earth ship was approaching Mars. And it will be like this—Jansen thought—in every other system to which we go. How can you picture what there will be? There is nothing at all in your past to give you a clue. You can only hope.

The planet was a beautiful green ball on the screen.

The thought which came out of Trian's mind was tinged with relief.

"I see how it was done. They have achieved a complete statis, a perfect state of suspended animation which they produce by an ingenious usage of the absolute zero of outer space. Thus, when they are—frozen, is the way they regard it—their minds do not function, and their lives are not detectable. They have just recently revived and are directing their ship."

Roymer digested the new information slowly. What kind of a race was this? A race which flew in primitive star ships, yet it had already conquered one of the greatest problems in Galactic history, a problem which had baffled the Galactics for millions of years. Roymer was uneasy.

"A very ingenious device," Trian was thinking, "they use it to alter the amount of subjective time consumed in their explorations. Their star ship has a very low maximum speed. Hence, without this—freeze—their voyage would take up a good portion of their lives."

"Can you classify the mind-type?" Roymer asked with growing concern.

Trian reflected silently for a moment.

"Yes," he said, "although the type is extremely unusual. I have never observed it before. General classification would be Human-Four. More specifically, I would place them at the Ninth level."

Roymer started. "The *Ninth* level?"

"Yes. As I say, they are extremely unusual."

Roymer was now clearly worried. He turned away and paced the deck for several moments. Abruptly, he left the room and went to the files of alien classification. He was gone for a long time, while Goladan fidgeted and Trian continued to gather information plucked across space from the alien minds. Roymer came back at last.

"What are they doing?"

"They are moving in on the second planet. They are about to determine whether the conditions are suitable there for an establishment of a colony of their kind."

Gravely, Roymer gave his orders to navigation. The patrol ship swung into motion, sped off swiftly in the direction of the second planet.

There was a single, huge blue ocean which covered an entire hemisphere of the new world. And the rest of the surface was a young jungle, wet and green and empty of any kind of people, choked with queer growths of green and orange. They circled the globe at a height of several thousand feet, and to their amazement and joy, they never saw a living thing; not a bird or a rabbit or the alien equivalent, in fact nothing alive at all. And so they stared in happy fascination.

"This is it," Jansen said again, his voice uneven.

"What do you think we ought to call it?" Cohn was speaking absently. "New Earth? Utopia?"

Together they watched the broken terrain slide by beneath them.

"No people at all. It's ours." And after a while Jansen said: "New Earth. That's a good name."

Cohn was observing the features of the ground intently.

"Do you notice the kind of . . . circular appearance of most of those mountain ranges? Like on the Moon, almost, but grown over and eroded. They're all almost perfect circles."

Pulling his mind away from the tremendous visions he had of the colony which would be here, Jansen tried to look at the mountains with an objective eye. Yes, he realized with faint surprise, they were round, like Moon craters.

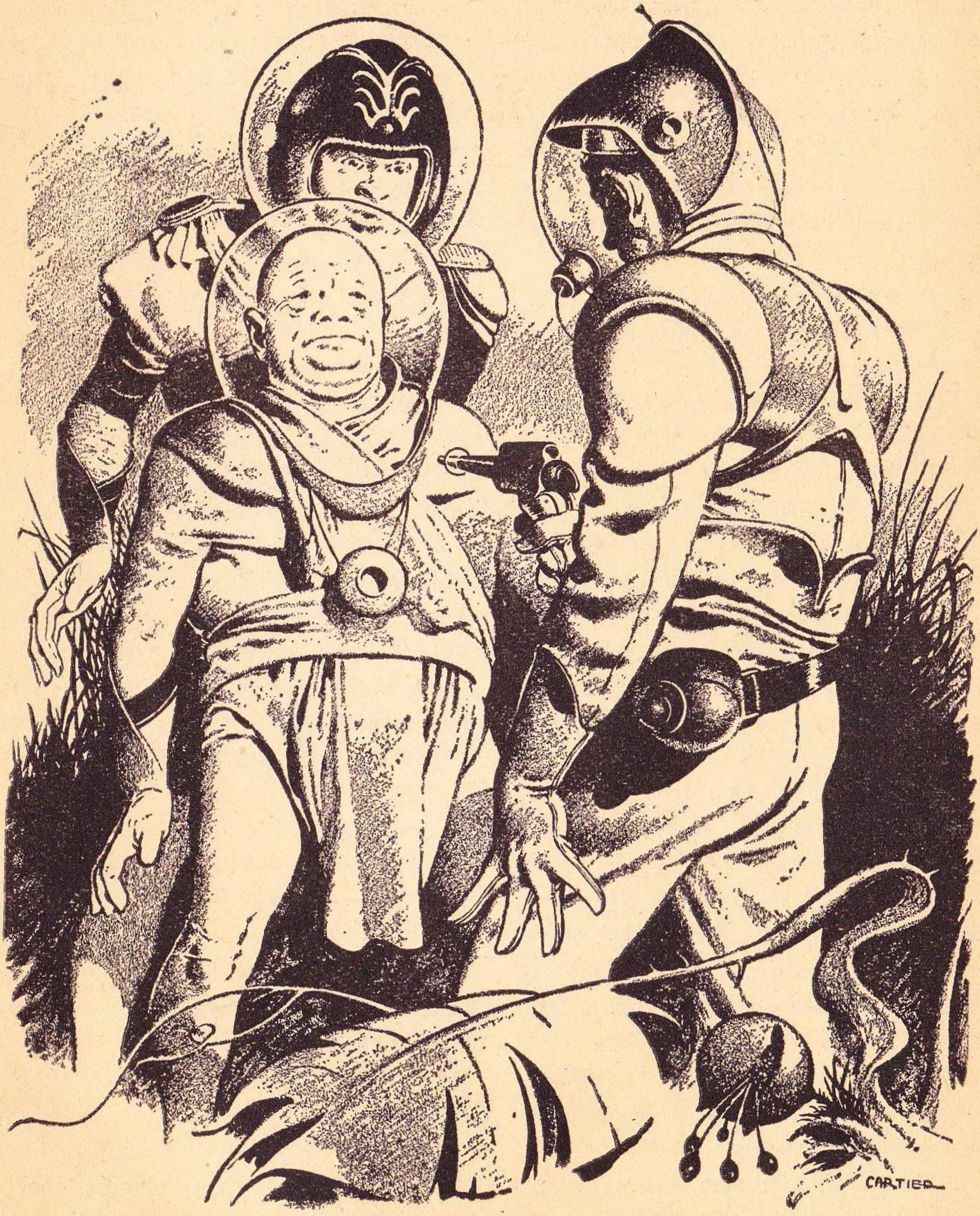
"Peculiar," Cohn muttered. "Not natural, I don't think. Couldn't be. Meteors not likely in this atmosphere. What in—?"

Jansen jumped. "Look there," he cried suddenly, "a round lake!"

Off toward the northern pole of the planet, a lake which was a perfect circle came slowly into view. There was no break in the rim other than that of a small stream which flowed in from the north.

"That's not natural," Cohn said briefly, "someone built that."

They were moving on to the dark side now, and Cohn turned the ship around. The sense of exhilaration was


CARTIER

too new for them to be let down, but the strange sight of a huge number of perfect circles, existing haphazardly like the remains of great splashes on the surface of the planet, was unnerving.

It was the sight of one particular crater, a great barren hole in the midst of a wide red desert, which rang a bell in Jansen's memory, and he blurted:

"A war! There was a war here. That one there looks just like a fusion bomb crater."

Cohn stared, then raised his eyebrows.

"I'll bet you're right."

"A bomb crater, do you see? Pushes up hills on all sides in a circle, and kills—" A sudden, terrible thought hit Jansen. Radioactivity. Would there be radioactivity here?

While Cohn brought the ship in low over the desert, he tried to calm Jansen's fears.

"There couldn't be much. Too much plant life. Jungles all over the place. Take it easy, man."

"But there's not a living thing on the planet. I'll bet that's why, there was a war. It got out of hand, the radioactivity got everything. We might have done this to Earth!"

They glided in over the flat emptiness of the desert, and the counters began to click madly.

"That's it," Jansen said conclusively, "still radioactive. It might not have been too long ago."

"Could have been a million years, for all we know."

"Well, most places are safe, apparently. We'll check before we go down."

As he pulled the ship up and away, Cohn whistled.

"Do you suppose there's really not a living thing? I mean, not a bug or a germ or even a virus? Why, it's like a clean new world, a nursery!" He could not take his eyes from the screen.

They were going down now. In a very little while they would be out and walking in the sun. The lust of the feeling was indescribable. They were Earthmen freed forever from the choked home of the System, Earthmen gone out to the stars, landing now upon the next world of their empire.

Cohn could not control himself.

"Do we need a flag?" he said grinning. "How do we claim this place?"

"Just set her down, man," Jansen roared.

Cohn began to chuckle.

"Oh, brave new world," he laughed, "that has *no* people in it."

"But why do we have to contact them?" Goladan asked impatiently. "Could we not just—"

Roymer interrupted without looking at him.

"The law requires that contact be made and the situation explained before action is taken. Otherwise it would be a barbarous act."

Goladan brooded.

The patrol ship hung in the shadow of the dark side, tracing the alien by its radioactive trail. The alien was going down for a landing on the daylight side.

Trian came forward with the other members of the Alien Contact Crew, reported to Roymer. "The aliens have landed."

"Yes," said Roymer, "we will let them have a little time. Trian, do you think you will have any difficulty in the transmission?"

"No. Conversation will not be difficult. Although the confused and complex nature of their thought-patterns does make their inner reactions somewhat obscure. But I do not think there will be any problem."

"Very well. You will remain here and relay the messages."

"Yes."

The patrol ship flashed quickly up over the north pole, then swung inward toward the equator, circling the spot where the alien had gone down. Roymer brought his ship in low and with the silence characteristic of a Galactic, landed her in a wooded spot a mile east of the alien. The Galactics remained in their ship for a short while as Trian continued his probe for information. When at last the Alien Contact Crew stepped out, Roymer and Goladan were in the lead. The rest of the crew faded quietly into the jungle.

As he walked through the young orange brush, Roymer regarded the world around him. Almost ready for repopulation, he thought, in another hundred years the radiation will all be gone, and we will come back. One by one the worlds of that war will be reclaimed.

He felt Trian's directions pop into his mind.

"You are approaching them. Proceed with caution. They are just beyond the next small rise. I think you had better wait, since they are remaining close to their ship."

Roymer sent back a silent yes. Motioning Goladan to be as quiet as possible, Roymer led the way up the last rise. In the jungle around him the Galactic crew moved silently.

The air was perfect; there was no radiation. Except for the wild orange color of the vegetation, the spot was a Garden of Eden. Jansen felt instinctively that there was no danger here, no terrible blight or virus or any harmful thing. He felt a violent urge to get out of his spacesuit and run and breathe, but it was forbidden. Not on the first trip. That would come later, after all the tests and experiments had been made and the world pronounced safe.

One of the first things Jansen did was get out the recorder and solemnly claim this world for the Solar Federation, recording the historic words for the archives of Earth. And he and Cohn remained for a while by the air

lock of their ship, gazing around at the strange yet familiar world into which they had come.

"Later on we'll search for ruins," Cohn said. "Keep an eye out for anything that moves. It's possible that there are some of them left and who knows what they'll look like. Mutants, probably, with five heads. So keep an eye open."

"Right."

Jansen began collecting samples of the ground, of the air, of the nearer foliage. The dirt was Earth-dirt, there was no difference. He reached down and crumbled the soft moist sod with his fingers. The flowers may be a little peculiar—probably mutated, he thought—but the dirt is honest to goodness dirt, and I'll bet the air is Earth-air.

He rose and stared into the clear open blue of the sky, feeling again an almost overpowering urge to throw open his helmet and breathe, and as he stared at the sky and at the green and orange hills, suddenly, a short distance from where he stood, a little old man came walking over a hill.

They stood facing each other across the silent space of a foreign glade. Roymer's face was old and smiling; Jansen looked back at him with absolute astonishment.

After a short pause, Roymer began to walk out onto the open soil, with Goladan following, and Jansen went for his heat gun.

"Cohn!" he yelled, in a raw brittle voice, "Cohn!"

And as Cohn turned and saw and froze, Jansen heard words being spoken in his brain. They were words coming from the little old man.

"Please do not shoot," the old man said, his lips unmoving.

"No, don't shoot," Cohn said quickly. "Wait. Let him alone." The hand of Cohn, too, was at his heat gun.

Roymer smiled. To the two Earthmen his face was incredibly old and wise and gentle. He was thinking: Had I been a nonhuman they would have killed me.

He sent a thought back to Trian. The Mind-Searcher picked it up and relayed it into the brains of the Earthmen, sending it through their cortical centers and then up into their conscious minds, so that the words were heard in the language of Earth.

"Thank you," Roymer said gently.

Jansen's hand held the heat gun leveled on Roymer's chest. He stared, not knowing what to say.

"Please remain where you are," Cohn's voice was hard and steady.

Roymer halted obligingly. Goladan stopped at his elbow, peering at the Earthmen with mingled fear and curiosity. The sight of fear helped Jansen very much.

"Who are you?" Cohn said clearly, separating the words.

Roymer folded his hands comfortably across his chest, he was still smiling.

"With your leave, I will explain our presence."

Cohn just stared.

"There will be a great deal to explain. May we sit down and talk?"

Trian helped with the suggestion. They sat down.

The sun of the new world was setting, and the conference went on. Roymer was doing most of the talking. The Earthmen sat transfixed.

It was like growing up suddenly, in the space of a second.

The history of Earth and of all Mankind just faded and dropped away. They heard of great races and worlds beyond number, the illimitable government which was the Galactic Federation. The fiction, the legends, the dreams of a thousand years had come true in a moment, in the figure of a square little old man who was not from Earth. There was a great deal for them to learn and accept in the time of a single afternoon, on an alien planet.

But it was just as new and real to them that they had discovered an uninhabited, fertile planet, the first to be found by Man. And they could not help but revolt from the sudden realization that the planet might well be someone else's property—that the Galactics owned everything worth owning.

It was an intolerable thought.

"How far," asked Cohn, as his heart pushed up in his throat, "does the Galactic League extend?"

Roymer's voice was calm and direct in their minds.

"Only throughout the central regions of the galaxy. There are millions of stars along the rim which have not as yet been explored."

Cohn relaxed, bowed down with relief. There was room then, for Earthmen.

"This planet. Is it part of the Federation?"

"Yes," said Roymer, and Cohn tried to mask his thought. Cohn was angry, and he hoped that the alien could not read his mind as well as he could talk to it. To have come this far—

"There was a race here once," Roymer was saying, "a humanoid race which was almost totally destroyed by war. This planet has been uninhabitable for a very long time. A few of its people who were in space at the time of the last attack were spared. The Federation established them elsewhere. When the planet is ready, the descendants of those survivors will be brought back. It is their home."

Neither of the Earthmen spoke.

"It is surprising," Roymer went on, "that your home world is in the desert. We had thought that there were no habitable worlds—"

"The desert?"

"Yes. The region of the galaxy from which you have come is that which we call the desert. It is an area almost entirely devoid of planets.

Would you mind telling me which star is your home?"

Cohn stiffened.

"I'm afraid our government would not permit us to disclose any information concerning our race."

"As you wish. I am sorry you are disturbed. I was curious to know—" He waved a negligent hand to show that the information was unimportant. We will get it later, he thought, when we decipher their charts. He was coming to the end of the conference, he was about to say what he had come to say.

"No doubt you have been exploring the stars about your world?"

The Earthmen both nodded. But for the question concerning Sol, they long ago would have lost all fear of this placid old man and his wide-eyed, silent companion.

"Perhaps you would like to know," said Roymer, "why your area is a desert."

Instantly, both Jansen and Cohn were completely absorbed. This was it, the end of three hundred years of searching. They would go home with the answer.

Roymer never relaxed.

"Not too long ago," he said, "approximately thirty thousand years by your reckoning, a great race ruled the desert, a race which was known as the Antha, and it was not a desert then. The Antha ruled hundreds of worlds. They were perhaps the greatest of all the Galactic peoples; certainly they were as brilliant a race as the galaxy has.ever known.

"But they were not a good race. For hundreds of years, while they were still young, we tried to bring them into the Federation. They refused, and of course we did not force them. But as the years went by the scope of their knowledge increased amazingly; shortly they were the technological equals of any other race in the galaxy. And then the Antha embarked upon an era of imperialistic expansion.

"They were superior, they knew it and were proud. And so they pushed out and enveloped the races and worlds of the area now known as the desert. Their rule was a tyranny unequaled in Galactic history."

The Earthmen never moved, and Roymer went on.

"But the Antha were not members of the Federation, and, therefore, they were not answerable for their acts. We could only stand by and watch as they spread their vicious rule from world to world. They were absolutely ruthless.

"As an example of their kind of rule, I will tell you of their crime against the Apectans.

"The planet of Apectus not only resisted the Antha, but somehow managed to hold out against their approach for several years. The Antha finally conquered and then, in retaliation for the Apectans' valor, they con-

ducted the most brutal of their mass experiments.

"They were a brilliant people. They had been experimenting with the genes of heredity. Somehow they found a way to alter the genes of the Apectans, who were humanoids like themselves, and they did it on a mass scale. They did not choose to exterminate the race, their revenge was much greater. Every Apectan born since the Antha invasion, has been born without one arm."

Jansen sucked in his breath. It was a very horrible thing to hear, and a sudden memory came into his brain. Caesar did that, he thought. He cut off the right hands of the Gauls. Peculiar coincidence. Jansen felt uneasy.

Roymer paused for a moment.

"The news of what happened to the Apectans set the Galactic peoples up in arms, but it was not until the Antha attacked a Federation world that we finally moved against them. It was the greatest war in the history of Life.

"You will perhaps understand how great a people the Antha were when I tell you that they alone, unaided, dependent entirely upon their own resources, fought the rest of the Galactics, and fought them to a standstill. As the terrible years went by we lost whole races and planets—like this one, which was one the Antha destroyed—and yet we could not defeat them.

"It was only after many years, when a Galactic invented the most dangerous weapon of all, that we won. The invention—of which only the Galactic Council has knowledge—enabled us to turn the suns of the Antha into novae, at long range. One by one we destroyed the Antha worlds. We hunted them through all the planets of the desert; for the first time in history the edict of the Federation was death, death for an entire race. At last there were no longer any habitable worlds where the Antha had been. We burned their worlds, and ran them down in space. Thirty thousand years ago, the civilization of the Antha perished."

Roymer had finished. He looked at the Earthmen out of grave, tired old eyes.

Cohn was staring in open-mouth fascination, but Jansen—unaccountably—felt a chill. The story of Caesar remained uncomfortably in his mind. And he had a quick, awful suspicion.

"Are you sure you got all of them?"

"No. Some surely must have escaped. There were too many in space, and space is without limits."

Jansen wanted to know: "Have any of them been heard of since?"

Roymer's smile left him as the truth came out. "No. Not until now."

There were only a few more seconds. He gave them time to understand. He could not help telling them that he was sorry, he even apologized. And then he sent the order with his mind.

The Antha died quickly and si-

lently, without pain.

Only thirty thousand years, Roymer was thinking, but thirty thousand years, and they came back out to the stars. They have no memory now of what they were or what they have done. They started all over again, the old history of the race has been lost, and in thirty thousand years they came all the way back.

Roymer shook his head with sad wonder and awe. The most brilliant people of all.

Goladan came in quietly with the final reports.

"There are no charts," he grumbled, "no maps at all. We will not be able to trace them to their home star."

Roymer did not know, really, what was right, to be disappointed or relieved. We cannot destroy them now, he thought, not right away. He could not help being relieved. Maybe this time there will be a way, and they will not have to be destroyed. They could be—

He remembered the edict—the edict of death. The Antha had forged it for themselves and it was just. He realized that there wasn't much hope.

The reports were on his desk and he regarded them with a wry smile. There was indeed no way to trace them back. They had no charts, only a regular series of course-check co-ordinates which were pre-set on their home planet and which were not decipherable. Even at this stage of their civilization they had already anticipated the consequences of having their ship fall into alien hands. And this although they lived in the desert.

Goladan startled him with an anxious question:

"What can we do?"

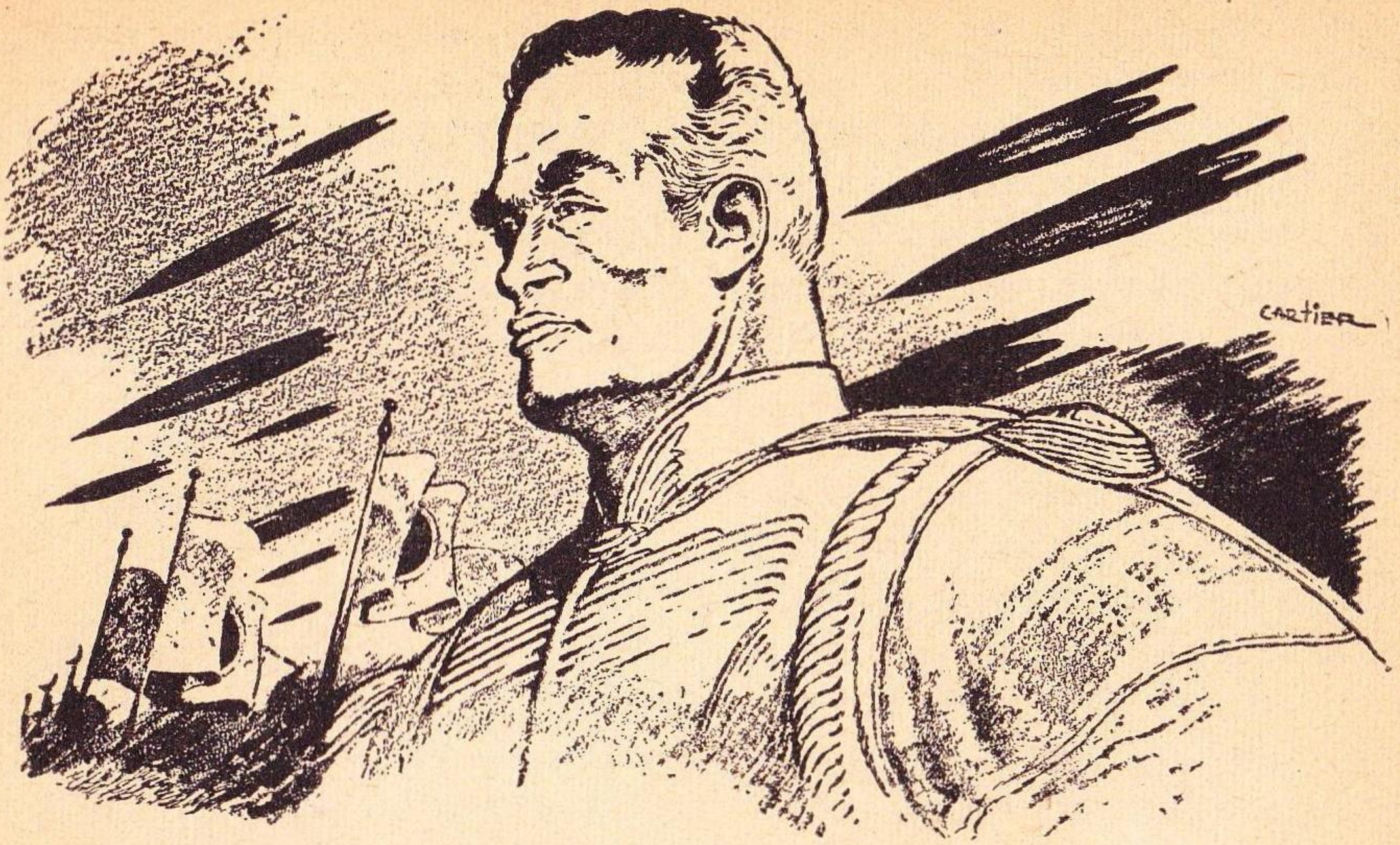
Roymer was silent.

We can wait, he thought. Gradually, one by one, they will come out of the desert, and when they come we will be waiting. Perhaps one day we will follow one back and destroy their world, and perhaps before then we will find a way to save them.

Suddenly, as his eyes wandered over the report before him and he recalled the ingenious mechanism of the freeze, a chilling, unbidden thought came into his brain.

And perhaps, he thought calmly, for he was a philosophical man, they will come out already equipped to rule the galaxy.

THE END



I AM NOTHING

BY ERIC FRANK RUSSELL

***This is** pure fiction—but this is also pure fact. Eric Russell wrote all of this story except the letter; that was written by a British child about eight years ago. So it is science fiction for it is truly based on fact.*

David Korman rasped, "Send them the ultimatum."

"Yes, sir, but—"

"But what?"

"It may mean war."

"What of it?"

"Nothing, sir." The other sought a way out. "I merely thought—"

"You are not paid to think," said Korman, acidly. "You are paid only to obey orders."

"Of course, sir. Most certainly." Gathering his papers he backed away hurriedly. "I shall have the ultimatum forwarded to Lani at once."

"You better had!" Korman stared across his ornate desk, watched the door close. Then he voiced an emphatic, "Bah!"

A lickspittle. He was surrounded by

lickspittles, cravens, weaklings. On all sides were the spineless ready to jump to his command, eager to fawn upon him. They smiled at him with false smiles, hastened into pseudo-agreement with every word he uttered, gave him exaggerated respect that served to cover their inward fears.

There was a reason for all this. He, David Korman, was strong. He was strong in the myriad ways that meant full and complete strength. With his broad body, big jowls, bushy brows and hard gray eyes he looked precisely what he was: a creature of measureless power, mental and physical.

It was good that he should be like this. It was a law of Nature that the weak must give way to the strong. A thoroughly sensible law. Besides, this world of Morcine needed a strong man. Morcine was one world in a cosmos full of potential competitors, all of them born of some misty, long-forgotten planet near a lost sun called Sol. Morcine's duty to itself was to grow strong at the expense of the weak. Follow the natural law.

His heavy thumb found the button on his desk, pressed it, and he said into the little silver microphone, "Send in Fleet Commander Rogers at once."

There was a knock at the door and he snapped, "Come in." Then, when Rogers had reached the desk, he informed, "We have sent the ultimatum."

"Really, sir? Do you suppose they'll accept it?"

"Doesn't matter whether they do or don't," Korman declared. "In either event we'll get our own way." His gaze upon the other became challenging. "Is the fleet disposed in readiness exactly as ordered?"

"It is, sir."

"You are certain of that? You have checked it in person?"

"Yes, sir."

"Very well. These are my orders: the fleet will observe the arrival on Lani of the courier bearing our demands. It will allow twenty-four hours for receipt of a satisfactory reply."

"And if one does not come?"

"It will attack one minute later in full strength. Its immediate task will be to capture and hold an adequate ground base. Having gained it, reinforcements will be poured in and the territorial conquest of the planet can proceed."

"I understand, sir." Rogers prepared to leave. "Is there anything more?"

"Yes," said Korman. "I have one other order. When you are about to seize this base my son's vessel must be the first to land upon it."

Rogers blinked and protested nervously, "But, sir, as a young lieutenant he commands a small scout bearing twenty men. Surely one of our major battleships should be—"

"My son lands first!" Standing up, Korman leaned forward over his desk.

His eyes were cold. "The knowledge that Reed Korman, my only child, was in the forefront of the battle will have an excellent psychological effect upon the ordinary masses here. I give it as my order."

"What if something happens?" murmured Rogers, aghast. "What if he should become a casualty, perhaps be killed?"

"That," Korman pointed out, "will enhance the effect."

"All right, sir." Rogers swallowed and hurried out, his features strained.

Had the responsibility for Reed Korman's safety been placed upon his own shoulders? Or was that character behind the desk genuine in his opportunist and dreadful fatalism? He did not know. He knew only that Korman could not be judged by ordinary standards.

Blank-faced and precise, the police escort stood around while Korman got out of the huge official car. He gave them his usual austere look-over while the chauffeur waited, his hand holding the door open. Then Korman mounted the steps to his home, heard the car door close at the sixth step. Invariably it was the sixth step, never the fifth or seventh.

Inside, the maid waited on the same corner of the carpet, her hands ready for his hat, gloves and cloak. She was stiff and starched and never looked directly at him. Not once in fourteen years had she met him eye to eye.

With a disdainful grunt he brushed past her and went into the dining room, took his seat, studied his wife across a long expanse of white cloth filled with silver and crystal.

She was tall and blond and blue-eyed and once had seemed supremely beautiful. Her willowy slenderness had made him think with pleasure of her moving in his arms with the sinuosity of a snake. Now, her slight curves had gained angularity. Her submissive eyes wore crinkles that were not the marks of laughter.

"I've had enough of Lani," he announced. "We're precipitating a showdown. An ultimatum has been sent."

"Yes, David."

That was what he had expected her to say. He could have said it for her. It was her trade-mark, so to speak; always had been, always would be.

Years ago, a quarter of a century back, he had said with becoming politeness, "Mary, I wish to marry you."

"Yes, David."

She had not wanted it—not in the sense that he had wanted it. Her family had pushed her into the arrangement and she had gone where shoved. Life was like that: the pushers and the pushed. Mary was of the latter class. The fact had taken the spice out of romance. The conquest had been too easy. Korman insisted on conquest but he liked it big. Not small.

Later on, when the proper time had come, he had told her, "Mary, I want a son."

She had arranged it precisely as ordered. No slipups. No presenting him with a fat and impudent daughter by way of hapless obstetrical rebellion. A son, eight pounds, afterward named Reed. He had chosen the name.

A faint scowl lay over his broad face as he informed, "Almost certainly it means war."

"Does it, David?"

It came without vibrancy or emotion. Dull-toned, her pale oval features expressionless, her eyes submissive. Now and again he wondered whether she hated him with a fierce, turbulent hatred so explosive that it had to be held in check at all costs. He could never be sure of that. Of one thing he was certain: she feared him and had from the very first.

Everyone feared him. Everyone without exception. Those who did not at first meeting soon learned to do so. He saw to that in one way or another. It was good to be feared. It was an excellent substitute for other emotions one has never had or known.

When a child he had feared his father long and ardently; also his mother. Both of them so greatly that their passing had come as a vast relief. Now it was his turn. That, too, was a natural law, fair and logical. What is gained from one generation should be passed to the next. What is denied should likewise be denied.

Justice.

"Reed's scoutship has joined the fleet in readiness for action."

"I know, David."

His eyebrows lifted. "How do you know?"

"I received a letter from him a couple of hours ago." She passed it across.

He was slow to unfold the stiff sheet of paper. He knew what the first two words would be. Getting it open, he found it upside-down, reversed it and looked.

"Dear Mother."

That was her revenge.

"Mary. I want a son."

So she had given him one—and then taken him away.

Now there were letters, perhaps two in one week or one in two months according to the ship's location. Always they were written as though addressing both, always they contained formal love to both, formal hope that both were keeping well.

But always they began, "Dear Mother."

Never, "Dear Father."

Revenge!

Zero hour came and went. Morcine was in a fever of excitement and preparation. Nobody knew what was happening far out in space, not even Korman. There was a time-lag due to sheer distance. Beamed signals from the fleet took many hours to come in.

The first word went straight to Korman's desk where he posed ready to receive it. It said the Lanians had replied with a protest and what they called an appeal to reason. In accordance with instructions the fleet commander had rejected this as unsatisfactory. The attack was on.

"They plead for reasonableness," he growled. "That means they want us to go soft. Life isn't made for the soft." He threw a glance forward. "Is it?"

"No, sir," agreed the messenger with alacrity.

"Tell Bathurst to put the tape on the air at once."

"Yes, sir."

When the other had gone he switched his midget radio and waited. It came in ten minutes, the long, rolling, grandiloquent speech he'd recorded more than a month before. It played on two themes: righteousness and strength, especially strength.

The alleged causes of the war were elucidated in detail, grimly but without ire. That lack of indignation was a telling touch because it suggested the utter inevitability of the present situation and the fact that the powerful have too much justified self-confidence to emote.

As for the causes, he listened to them with boredom. Only the strong know there is but one cause of war. All the other multitudinous reasons recorded in the history books were not real reasons at all. They were nothing but plausible pretexts. There was but one root-cause that persisted right back to the dim days of the jungle. When two monkeys want the same banana, that is war.

Of course, the broadcasting tape wisely refrained from putting the issue so bluntly and revealingly. Weak stomachs require pap. Red meat is exclusively for the strong. So the great antenna of the world network comported themselves accordingly and catered for the general dietary need.

After the broadcast had finished on a heartening note about Morcine's overwhelming power, he leaned back in his chair and thought things over. There was no question of bombing Lani into submission from the upper reaches of its atmosphere. All its cities cowered beneath bombproof hemispherical force fields. Even if they had been wide open he would not have ordered their destruction. It is empty victory to win a few mounds of rubble.

He'd had enough of empty victories. Instinctively, his gray eyes strayed toward the bookcase on which stood the photograph he seldom noticed and then no more than absently. For years it had been there, a subconsciously-observed, taken-for-granted object like the inkpot or radiant heat panel, but less useful than either.

She wasn't like her picture now. Come to think of it, she hadn't been really like it *then*. She had given him obedience and fear before he had

learned the need for these in lieu of other needs. At that time he had wanted something else that had not been forthcoming. So long as he could remember, to his very earliest years, it had never been forthcoming, not from anyone, never, never, never.

He jerked his mind back to the subject of Lani. The location of that place and the nature of its defenses determined the pattern of conquest. A ground base must be won, constantly replenished with troops, arms and all auxiliary services. From there the forces of Morcine must expand and, bit by bit, take over all unshielded territory until at last the protected cities stood alone in fateful isolation. The cities would then be permitted to sit under their shields until starved into surrender.

Acquisition of enemy territory was the essential aim. This meant that despite space-going vessels, force shields and all the other redoubtable gadgets of ultra-modernism, the ordinary foot soldier remained the final arbiter of victory. Machines could assault and destroy. Only men could take and hold.

Therefore this was going to be no mere five-minute war. It would run on for a few months, perhaps even a year, with spasms of old style land-fighting as strong points were attacked and defended. There would be bombing perforce limited to road blocks, strategic junctions, enemy assembly and regrouping areas, unshielded but stubborn villages.

There would be some destruction, some casualties. But it was better that way. Real conquest comes only over real obstacles, not imaginary ones. In her hour of triumph Morcine would be feared. Korman would be feared. The feared are respected and that is proper and decent.

If one can have nothing more.

Pictorial records in full color and sound came at the end of the month. Their first showing was in the privacy of his own home to a small audience composed of himself, his wife, a group of government officials and assorted brass hats.

Unhampered by Lanian air defenses, weak from the beginning and now almost wiped out, the long black ships of Morcine dived into the constantly widening base and unloaded great quantities of supplies. Troops moved forward against tough but spasmodic opposition, a growing weight of armored and motorized equipment going with them.

The recording camera trundled across an enormous bridge with thick girders fantastically distorted and with great gaps temporarily filled in. It took them through seven battered villages which the enemy had either defended or given cause to believe they intended to defend. There were shots of crater-pocked roads, skeletal houses, a blackened barn with a swollen horse lying in a field nearby.

And an action-take of an assault on a farmhouse. A patrol, suddenly fired on, dug in and radioed back. A monster on huge, noisy tracks answered their call, rumbled laboriously to within four hundred yards of the objective, spat violently and lavishly from its front turret. A great splash of liquid fell on the farmhouse roof, burst into roaring flame. Figures ran out, seeking cover of an adjacent thicket. The sound track emitted rattling noises. The figures fell over, rolled, jerked, lay still.

The reel ended and Korman said, "I approve it for public exhibition." Getting out of his seat, he frowned around, added, "I have one criticism. My son has taken command of a company of infantry. He is doing a job, like any other man. Why wasn't he featured?"

"We would not depict him except with your approval, sir," said one.

"I not only approve—I order it. Make sure that he is shown next time. Not predominantly. Just sufficiently to let the people see for themselves that he is there, sharing the hardships and the risks."

"Very well, sir."

They packed up and went away. He strolled restlessly on the thick carpet in front of the electric radiator.

"Do them good to know Reed is among those present," he insisted.

"Yes, David." She had taken up some knitting, her needles going *click-click*.

"He's my son."

"Yes, David."

Stopping his pacing, he chewed his bottom lip with irritation. "Can't you say anything but that?"

She raised her eyes. "Do you wish me to?"

"Do I wish!" he echoed. His fists were tight as he resumed his movements to and fro while she returned to her needles.

What did she know of wishes?

What does anyone know?

By the end of four months the territorial grip on Lani had grown to one thousand square miles while men and guns continued to pour in. Progress had been slower than expected. There had been minor blunders at high level, a few of the unforeseeable difficulties that invariably crop up when fighting at long range, and resistance had been desperate where least expected. Nevertheless, progress was being made. Though a little postdated, the inevitable remained inevitable.

Korman came home, heard the car door snap shut at the sixth step. All was as before except that now a part of the populace insisted on assembling to cheer him indoors. The maid waited, took his things. He stumped heavily to the inner room.

"Reed is being promoted to captain."

She did not answer.

Standing squarely before her, he demanded. "Well, aren't you in-

terested?"

"Of course, David." Putting aside her book, she folded long, thin-fingered hands, looked toward the window.

"What's the matter with you?"

"The matter?" The blond eyebrows arched as her eyes came up. "Nothing is the matter with me. Why do you ask?"

"I can tell." His tones harshened a little. "And I can guess. You don't like Reed being out there. You disapprove of me sending him away from you. You think of him as your son and not mine. You—"

She faced him calmly. "You're rather tired, David. And worried."

"I am not tired," he denied with unnecessary loudness. "Neither am I worried. It is the weak who worry."

"The weak have reason."

"I haven't."

"Then you're just plain hungry." She took a seat at the table. "Have something to eat. It will make you feel better."

Dissatisfied and disgruntled, he got through his evening meal. Mary was holding something back, he knew that with the sureness of one who had lived with her for half his lifetime. But he did not have to force it out of her by autocratic methods. When and only when he had finished eating she surrendered her secret voluntarily. The way in which she did it concealed the blow to come.

"There has been another letter from Reed."

"Yes?" He fingered a glass of wine, felt soothed by food but reluctant to show it. "I know he's happy, healthy and in one piece. If anything went wrong, I'd be the first to learn of it."

"Don't you want to see what he says?" She took it from a little walnut bureau, offered it to him.

He eyed it without reaching for it. "Oh, I suppose it's all the usual chitchat about the war."

"I think you ought to read it," she persisted.

"Do you?" Taking it from her hand he held it unopened, surveyed her curiously. "Why should this particular missive call for my attention? Is it any different from the others? I know without looking that it is addressed to you. Not to me. To you! Never in his life has Reed written a letter specifically to me."

"He writes to both of us."

"Then why can't he start with, 'Dear Father and Mother?'"

"Probably it just hasn't occurred to him that you would feel touchy about it. Besides, it's cumbersome."

"Nonsense!"

"Well, you might as well look at it as argue about it unread. You'll have to know sooner or later."

That last remark stimulated him into action. Unfolding it, he grunted as he noted the opening words, then went through ten paragraphs descriptive of war service on another planet. It was the sort of stuff every fighting

man sent home. Nothing especial about it. Turning the page, he perused the brief remainder. His face went taut and heightened in color.

"Better tell you I've become the willing slave of a Lanian girl. Found her in what little was left of the village of Bluelake which had taken a pretty bad beating from our heavies. She was all alone and, as far as I could discover, seemed to be the sole survivor. Mom, she's got nobody. I'm sending her home on the hospital ship *Istar*. The captain jibbed but dared not refuse a Korman. Please meet her for me and look after her until I get back."

Flinging it onto the table, he swore lengthily and with vim, finishing, "The young imbecile."

Saying nothing, Mary sat watching him, her hands clasped together.

"The eyes of a whole world are on him," he raged. "As a public figure, as the son of his father, he is expected to be an example. And what does he do?"

She remained silent.

"Becomes the easy victim of some designing little skirt who is quick to play upon his sympathies. An enemy female!"

"She must be pretty," said Mary.

"*No* Lanians are pretty," he contradicted in what came near to a shout. "Have you taken leave of your senses?"

"No, David, of course not."

"Then why make such pointless remarks? One idiot in the family is enough." He punched his right fist several times into the palm of his left hand. "At the very time when anti-Lanian sentiment is at its height I can well imagine the effect on public opinion if it became known that we were harboring a specially favored enemy alien, pampering some painted and powdered huzzy who has dug her claws into Reed. I can see her mincing proudly around, one of the vanquished who became a victor by making use of a dope. Reed must be out of his mind."

"Reed is twenty-three," she observed.

"What of it? Are you asserting that there's a specific age at which a man has a right to make a fool of himself?"

"David, I did not say that."

"You implied it." More hand-punching. "Reed has shown an unsuspected strain of weakness. It doesn't come from me."

"No, David, it doesn't."

He stared at her, seeking what lay unspoken behind that remark. It eluded him. His mind was not her mind. He could not think in her terms. Only in his own.

"I'll bring this madness to a drastic stop. If Reed lacks strength of character, it is for me to provide it." He found the telephone, remarked as he picked it up, "There are thousands of girls on Morcine. If Reed feels that he must have romance, he can find it at home."

"He's not home," Mary mentioned. "He is far away."

"For a few months. A mere nothing." The phone whirred and he barked into it, "Has the *Istar* left Lani yet?" He held on a while, then racked the instrument and rumbled aggrievedly, "I'd have had her thrown off but it's too late. The *Istar* departed soon after the mailboat that brought his letter." He made a face and it was not pleasant. "The girl is due here tomorrow. She's got a nerve, a blatant impudence. It reveals her character in advance."

Facing the big, slow-ticking clock that stood by the wall, he gazed at it as if tomorrow were due any moment. His mind was working on the problem so suddenly dumped in his lap. After a while, he spoke again.

"That scheming baggage is not going to carve herself a comfortable niche in my home, no matter what Reed thinks of her. I will not have her, see?"

"I see, David."

"If he is weak, I am not. So when she arrives I'm going to give her the roughest hour of her life. By the time I've finished she'll be more than glad of passage back to Lani on the next ship. She'll get out in a hurry and for keeps."

Mary remained quiet.

"But I'm not going to indulge a sordid domestic fracas in public. I won't allow her even the satisfaction of that. I want you to meet her at the spaceport, phone me immediately she arrives, then bring her to my office. I'll cope with her there."

"Yes, David."

"And don't forget to call me beforehand. It will give me time to clear the place and insure some privacy."

"I will remember," she promised.

It was three-thirty in the following afternoon when the call came through. He shooed out a fleet admiral, two generals and an intelligence service director, hurried through the most urgent of his papers, cleared the desk and mentally prepared himself for the distasteful task to come.

In short time his intercom squeaked and his secretary's voice announced, "Two people to see you, sir—Mrs. Korman and Miss Tatiana Hurst."

"Show them in."

He leaned backward, face suitably severe. Tatiana, he thought. An outlandish name. It was easy to visualize the sort of hoyden who owned it: a flouncy thing, aged beyond her years and with a sharp eye to the main chance. The sort who could make easy meat of someone young, inexperienced and impressionable, like Reed. Doubtless she had supreme confidence that she could butter the old man with equal effectiveness and no trouble whatsoever. Hah, that was her mistake.

The door opened and they came in and stood before him without speaking. For half a minute he studied

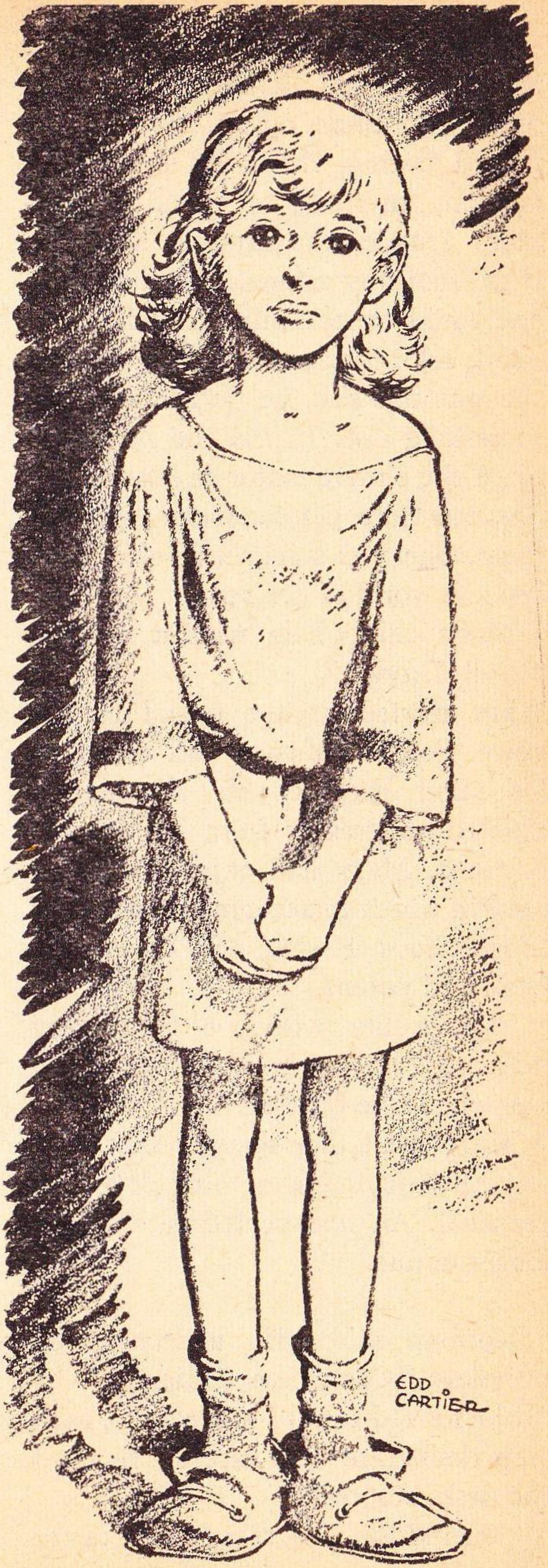
them while his mind did sideslips, repeatedly strove to co-ordinate itself, and a dozen expressions came and went in his face. Finally, he arose slowly to his feet, spoke to Mary, his tones frankly bewildered.

"Well, where is she?"

"This," informed Mary, with unconcealed and inexplicable satisfaction, "is her."

He flopped back into his chair, looked incredulously at Miss Tatiana Hurst. She had skinny legs exposed to knee height. Her clothing was much the worse for wear. Her face was a pale, hollow-cheeked oval from which a pair of enormous dark eyes gazed in a non-focusing, introspective manner as if she continually kept watch within her rather than upon things outside. One small white hand held Mary's, the other arm was around a large and brand new teddy-bear gained from a source at which he could guess. Her age was about eight. Certainly no more than eight.

It was the eyes that got him most, terribly solemn, terribly grave and unwilling to see. There was a coldness in his stomach as he observed them. She was not blind. She could look at him all right—but she looked without really perceiving. The great dark orbs could turn toward him and register the mere essential of his being while all the time they saw only the secret places within herself. It was eerie in the extreme and more than discomforting.



Watching her fascinatedly, he tried to analyze and define the peculiar quality in those optics. He had expected daring, defiance, impudence, passion, anything of which a predatory female was capable. Here, in these radically altered circumstances, one could expect childish embarrassment, self-consciousness, shyness. But she was not shy, he decided. It was something else. In the end he recognized the elusive factor as absentness. She was here yet somehow not with them. She was somewhere else, deep inside a world of her own.

Mary chipped in with a sudden, "Well, David?"

He started at the sound of her voice. Some confusion still cluttered his mind because this culmination differed so greatly from his preconceptions. Mary had enjoyed half an hour in which to accommodate herself to the shock. He had not. It was still fresh and potent.

"Leave her with me for a few minutes," he suggested. "I'll call you when I've finished."

Mary went, her manner that of a woman enjoying something deep and personal. An unexpected satisfaction long overdue.

Korman said with unaccustomed mildness, "Come here, Tatiana."

She moved toward him slowly, each step deliberate and careful, touched the desk, stopped.

"Round this side, please, near to my chair."

With the same almost robotic gait she did as instructed, her dark eyes looking expressionlessly to the front. Arriving at his chair, she waited in silence.

He drew in a deep breath. It seemed to him that her manner was born of a tiny voice insisting, "I must be obedient. I must do as I am told. I can do only what I am told to do."

So she did it as one compelled to accept those things she had no means of resisting. It was surrender to all demands in order to keep one hidden and precious place intact. There was no other way.

Rather appalled, he said, "You're able to speak, aren't you?"

She nodded, slightly and only once.

"But that isn't speech," he pointed out.

There was no desire to contradict or provide proof of ability. She accepted his statement as obvious and left it at that. Silent and immensely grave, she clung to her bear and waited for Korman's world to cease troubling her own.

"Are you glad you're here, or sorry?"

No reaction. Only inward contemplation. Absentness.

"Well, are you glad then?"

A vague half-nod.

"You are not sorry to be here?"

An even vaguer shake.

"Would you rather stay than go back?"

She looked at him, not so much to see him as to insure that he could see her.

He rang his bell, said to Mary, "Take her home."

"Home, David?"

"That's what I said." He did not like the exaggerated sweetness of her tone. It meant something, but he couldn't discern what.

The door closed behind the pair of them. His fingers tapped restlessly on the desk as he pictured those eyes. Something small and bitterly cold was in his insides.

During the next couple of weeks his mind seemed to be filled with more problems than ever before. Like most men of his caliber he had the ability to ponder several subjects at once, but not the insight to detect when one was gaining predominance over the others.

On the first two or three of these days he ignored the pale intruder in his household. Yet he could not deny her presence. She was always there, quiet, obedient, self-effacing, hollow-cheeked and huge-eyed. Often she sat around for long periods without stirring, like a discarded doll.

When addressed by Mary or one of the maids she remained deaf to inconsequential remarks, responded to direct and imperative questions or orders. She would answer with minimum head movements or hand gestures when these sufficed, spoke monosyllabically in a thin little voice only when speech was unavoidable. During that time Korman did not speak to her at all—but he was compelled to notice her fatalistic acceptance of the fact that she was no part of his complicated life.

After lunch on the fourth day he caught her alone, bent down to her height and demanded, "Tatiana, what is the matter with you? Are you unhappy here?"

One brief shake of her head.

"Then why don't you laugh and play like other—?" He ceased abruptly as Mary entered the room.

"You two having a private gossip?" she inquired.

"As if we could," he snapped.

That same evening he saw the latest pictorial record from the fighting front. It gave him little satisfaction. Indeed, it almost irked him. The zip was missing. Much of the thrill of conquest had mysteriously evaporated from the pictures.

By the end of the fortnight he'd had more than enough of listening for a voice that seldom spoke and meeting eyes that did not see. It was like living with a ghost—and it could not go on. A man is entitled to a modicum of relaxation in his own home.

Certainly he could kick her back to Lani as he had threatened to do at the first. That, however, would be admission of defeat. Korman just could not accept defeat at anyone's hands, much less those of a brooding

child. She was not going to edge him out of his own home nor persuade him to throw her out. She was a challenge he had to overcome in a way thoroughly satisfactory to himself.

Summoning his chief scientific adviser to his office, he declaimed with irritation, "Look, I'm saddled with a maladjusted child. My son took a fancy to her and shipped her from Lani. She's getting in my hair. What can be done about it?"

"Afraid I cannot help much, sir."

"Why not?"

"I'm a physicist."

"Well, can you suggest anyone else?"

The other thought a bit, said, "There's nobody in my department, sir. But science isn't solely concerned with production of gadgets. You need a specialist in things less tangible." A pause, then, "The hospital authorities might put you on to someone suitable."

He tried the nearest hospital, got the answer, "A child psychologist is your man."

"Who's the best on this planet?"

"Dr. Jager."

"Contact him for me. I want him at my house this evening, not later than seven o'clock."

Fat, middle-aged and jovial, Jager fell easily into the role of a casual friend who had just dropped in. He chatted a lot of foolishness, included Tatiana in the conversation by throwing odd remarks at her, even held a pretended conversation with her teddy-bear. Twice in an hour she came into his world just long enough to register a fleeting smile—then swiftly she was back in her own.

At the end of this he hinted that he and Tatiana should be left by themselves. Korman went out, convinced that no progress was being or would be made. In the lounge Mary glanced up from her seat.

"Who's our visitor, David? Or is it no business of mine?"

"Some kind of mental specialist. He's examining Tatiana."

"Really?" Again the sweetness that was bitter.

"Yes," he rasped. "Really."

"I didn't think you were interested in her."

"I am not," he asserted. "But Reed is. Now and again I like to remind myself that Reed is my son."

She let the subject drop. Korman got on with some official papers until Jager had finished. Then he went back to the room, leaving Mary immersed in her book. He looked around.

"Where is she?"

"The maid took her. Said it was her bedtime."

"Oh." He found a seat, waited to hear more.

Resting against the edge of a table, Jager explained, "I've a playful little gag for dealing with children who are reluctant to talk. Nine times out of ten it works."

"What is it?"

"I persuade them to *write*. Strangely enough, they'll often do that, especially if I make a game of it. I cajole them into writing a story or essay about anything that created a great impression upon them. The results can be very revealing."

"And did you—?"

"A moment, please, Mr. Korman. Before I go further I'd like to impress upon you that children have an inherent ability many authors must envy. They can express themselves with remarkable vividness in simple language, with great economy of words. They create telling effect with what they leave out as much as by what they put in." He eyed Korman speculatively. "You know the circumstances in which your son found this child?"

"Yes, he told us in a letter."

"Well, bearing those circumstances in mind I think you'll find this something exceptional in the way of horror stories." He held out a sheet of paper. "She wrote it unaided." He reached for his hat and coat.

"You're going?" questioned Korman in surprise. "What about your diagnosis? What treatment do you suggest?"

Dr. Jager paused, hand on door. "Mr. Korman, you are an intelligent person." He indicated the sheet the other was holding. "I think that is all you require."

Then he departed. Korman eyed the sheet. It was not filled with words as he'd expected. For a story it was mighty short. He read it.

I am nothing and nobody. My house went bang. My cat was stuck to a wall. I wanted to pull it off. They wouldn't let me. They threw it away.

The cold thing in the pit of his stomach swelled up. He read it again. And again. He went to the base of the stairs and looked up toward where she was sleeping.

The enemy whom he had made nothing.

Slumber came hard that night. Usually he could compose his mind and snatch a nap any time, anywhere, at a moment's notice. Now he was strangely restless, unsettled. His brain was stimulated by he knew not what and it insisted on following tortuous paths.

The frequent waking periods were full of fantastic imaginings wherein he fumbled through a vast and cloying grayness in which was no sound, no voice, no other being. The dreams were worse, full of writhing landscapes spewing smoky columns, with things howling through the sky, with huge, toadlike monsters crawling on metal tracks, with long lines of dusty men singing an aeons-old and forgotten song.

"You've left behind a broken doll."

He awakened early with weary eyes and a tired mind. All morning at the office a multitude of trifling things

conspired against him. His ability to concentrate was not up to the mark and several times he had to catch himself on minor errors just made or about to be made. Once or twice he found himself gazing meditatively forward with eyes that did not see to the front but were looking where they had never looked before.

At three in the afternoon his secretary called on the intercom, "Astroleader Warren would like to see you, sir."

"Astroleader?" he echoed, wondering whether he had heard aright. "There's no such title."

"It is a Drakan space-rank."

"Oh, yes, of course. I can tend to him now."

He waited with dull anticipation. The Drakans formed a powerful combine of ten planets at great distance from Morcine. They were so far away that contact came seldom. A battleship of theirs had paid a courtesy call about twice in his lifetime. So this occasion was a rare one.

The visitor entered, a big-built youngster in light-green uniform. Shaking hands with genuine pleasure and great cordiality, he accepted the indicated chair.

"A surprise, eh, Mr. Korman?"

"Very."

"We came in a deuce of a hurry but the trip can't be done in a day. Distance takes time unfortunately."

"I know."

"The position is this," explained Warren. "Long while back we received a call from Lani relayed by intervening minor planets. They said they were involved in a serious dispute and feared war. They appealed to us to negotiate as disinterested neutrals."

"Ah, so that's why you've come?"

"Yes, Mr. Korman. We knew the chance was small of arriving in time. There was nothing for it but to come as fast as we could and hope for the best. The role of peacemaker appeals to those with any claim to be civilized."

"Does it?" questioned Korman, watching him.

"It does to us." Leaning forward, Warren met him eye to eye. "We've called at Lani on the way here. They still want peace. They're losing the battle. Therefore we want to know only one thing: Are we too late?"

That was the leading question: Are we too late? Yes or no? Korman stewed it without realizing that not so long ago his answer would have been prompt and automatic. Today, he thought it over.

Yes or no? Yes meant military victory, power and fear. No meant—what? Well, no meant a display of reasonableness in lieu of stubbornness. No meant a considerable change of mind. It struck him suddenly that one must possess redoubtable force of character to throw away a long-nursed viewpoint and adopt a new one. It required moral courage. The weak and the faltering could never

achieve it.

"No," he replied slowly. "It is not too late."

Warren stood up, his face showing that this was not the answer he had expected. "You mean, Mr. Korman—?"

"Your journey has not been in vain. You may negotiate."

"On what terms?"

"The fairest to both sides that you can contrive." He switched his microphone, spoke into it. "Tell Rogers that I order our forces to cease hostilities forthwith. Troops will guard the perimeter of the Lani ground base pending peace negotiations. Citizens of the Drakan Confederation will be permitted unobstructed passage through our lines in either direction."

"Very well, Mr. Korman."

Putting the microphone aside, he continued with Warren, "Though far off in mere miles, Lani is near to us as cosmic distances go. It would please me if the Lanians agreed to a union between our planets, with common citizenship, common development of natural resources. But I don't insist upon it. I merely express a wish—knowing that some wishes never come true."

"The notion will be given serious consideration all the same," assured Warren. He shook hands with boyish enthusiasm. "You're a big man, Mr. Korman."

"Am I?" He gave a wry smile. "I'm trying to do a bit of growing in another direction. The original one kind of got used up."

When the other had gone, he tossed a wad of documents into a drawer. Most of them were useless now. Strange how he seemed to be breathing better than ever before, his lungs drawing more fully.

In the outer office he informed, "It's early yet, but I'm going home. Phone me there if anything urgent comes along."

The chauffeur closed the car door at the sixth step. A weakling, thought Korman as he went into his home. A lamebrain lacking the strength to haul himself out of a self-created rut. One can stay in a rut too long.

He asked the maid, "Where is my wife?"

"Slipped out ten minutes ago, sir. She said she'd be back in half an hour."

"Did she take—"

"No, sir." The maid glanced toward the lounge.

Cautiously he entered the lounge, found the child resting on the settee, head back, eyes closed. A radio played softly nearby. He doubted whether she had turned it on of her own accord or was listening to it. More likely someone else had left it running.

Tiptoeing across the carpet, he cut off the faint music. She opened her eyes, sat upright. Going to the settee, he took the bear from her side and placed it on an arm, positioned him-

self next to her.

"Tatiana," he asked with rough gentleness, "why are you nothing?"

No answer. No change.

"Is it because you have nobody?"

Silence.

"Nobody of your own?" he persisted, feeling a queer kind of desperation. "Not even a kitten?"

She looked down at her shoes, her big eyes partly shielded under pale lids. There was no other reaction.

Defeat. Ah, the bitterness of defeat. It set his fingers fumbling with each other, like those of one in great and unbearable trouble. Phrases tumbled through his mind.

"I am nothing."

"My cat . . . they threw it away."

His gaze wandered blindly over the room while his mind ran round and round her wall of silence seeking a door it could not find. Was there no way in, no way at all?

There was.

He discovered it quite unwittingly.

To himself rather than to her he murmured in a hearable undertone, "Since I was very small I have been surrounded by people. All my life there have been lots of people. But none were mine. Not one was really mine. Not one. I, too, am nothing."

She patted his hand.

The shock was immense. Startled beyond measure, he glanced down at the first touch, watched her give three or four comforting little dabs and hastily withdraw. There was heavy pulsing in his veins. Something within him rapidly became too big to contain.

Twisting sidewise, he snatched her onto his lap, put his arms around her, buried his nose in the soft part of her neck, nuzzled behind her ear, ran his big hand through her hair. And all the time he rocked to and fro with low crooning noises.

She was weeping. She hadn't been able to weep before. She was weeping, not as a woman does, softly and subdued, but like a child, with great racking sobs that she fought hard to suppress.

Her arm was around his neck, tightening, clinging and tightening more while he rocked and stroked and called her "Honey" and uttered silly sounds and wildly extravagant reassurances.

This was victory.

Not empty.

Full.

Victory over self is completely full.

THE END

An ASF Factual Article

(PHOTOGRAPH: AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK.)

Comet Donati when it was at its brightest, October 5, 1858. This drawing was made in Berlin.

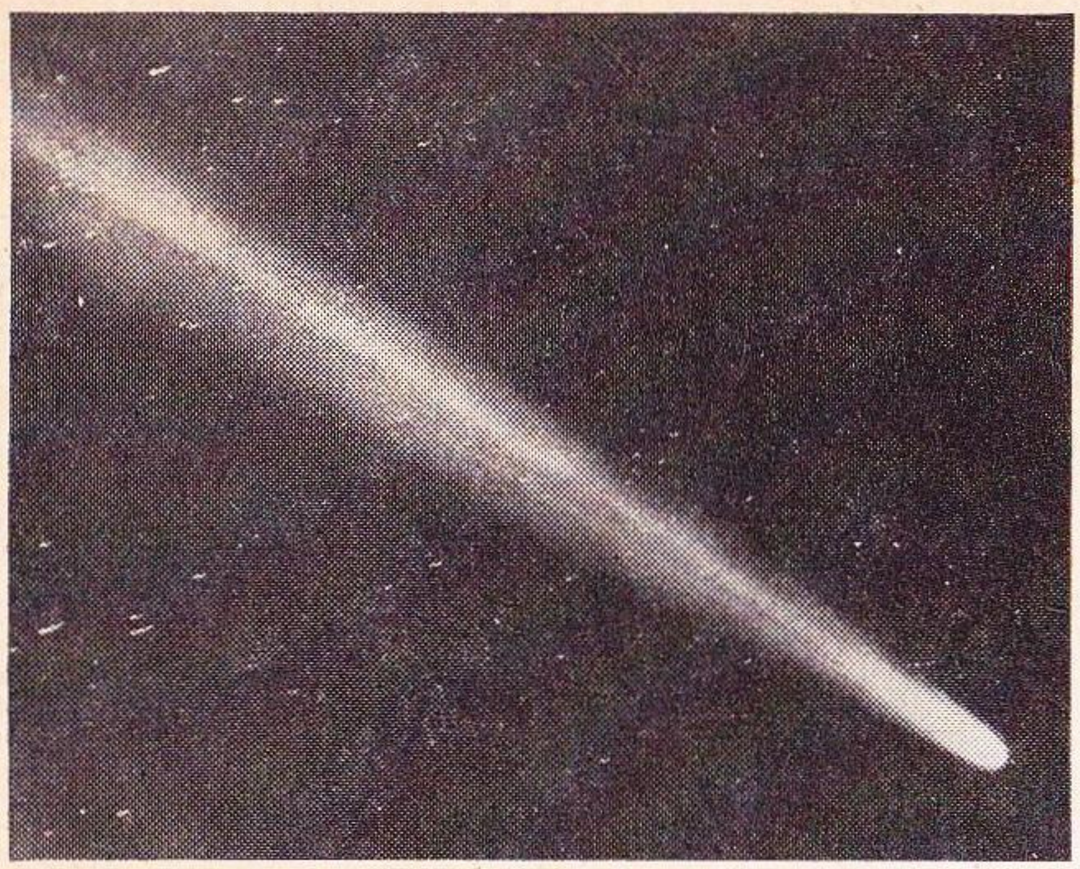
COMETS

BY WILLY LEY

The most *spectacular of all astronomical phenomena—a major comet—hasn't been seen in three generations. How spectacular a full-fledged comet can be, however, we can judge from older accounts . . .*

The last three generations of humanity have had the bad luck of not having been granted a view of what must be one of the most glorious celestial spectacles—namely a really large comet. Only those now well over eighty years old might remember what was probably the last passably impressive naked-eye comet, that of 1882. That lack of bright comets is all the more regrettable since a large percentage of just the last two generations would have enjoyed the display without superstitious fear.

Unfortunately that time interval in



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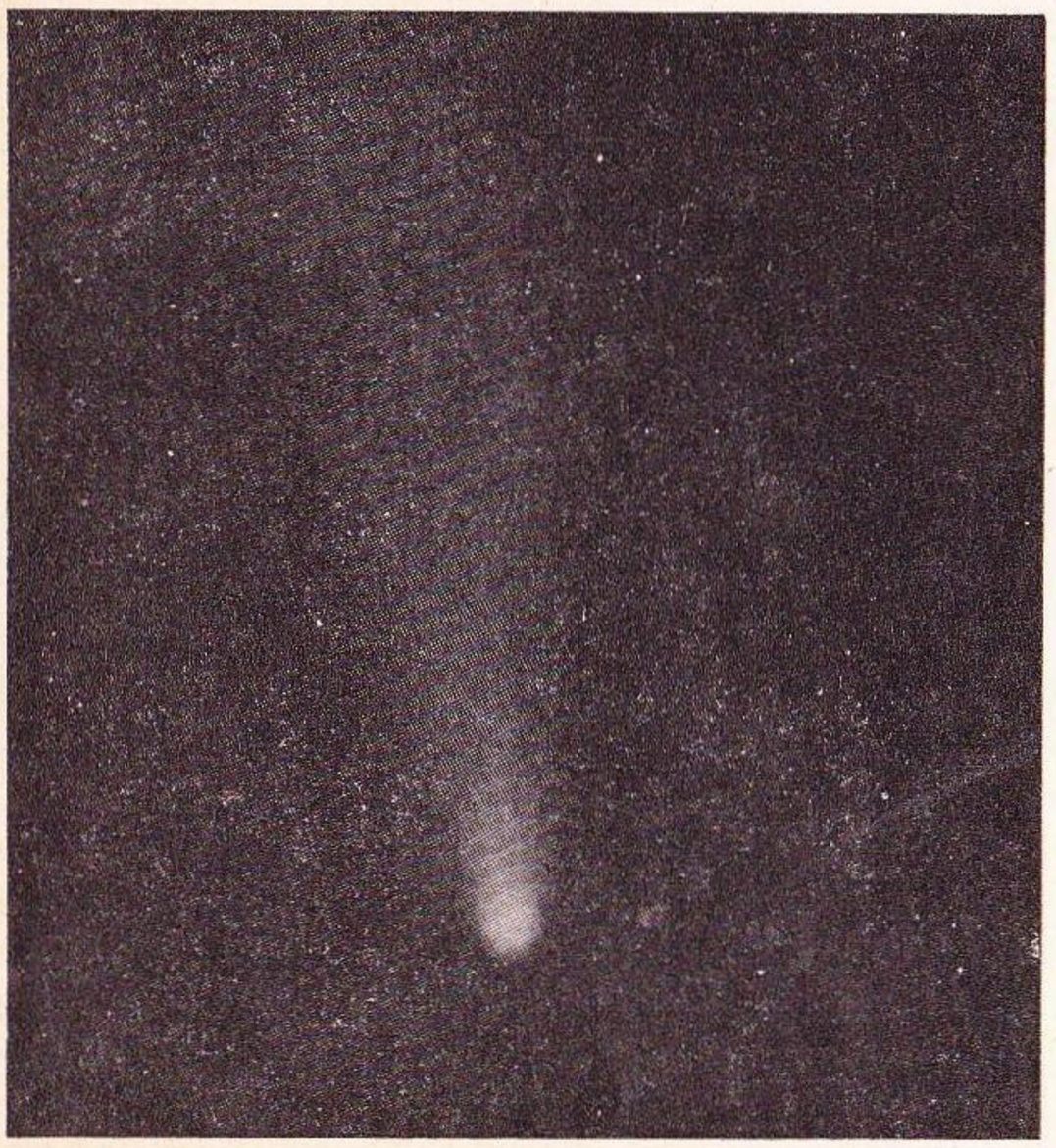
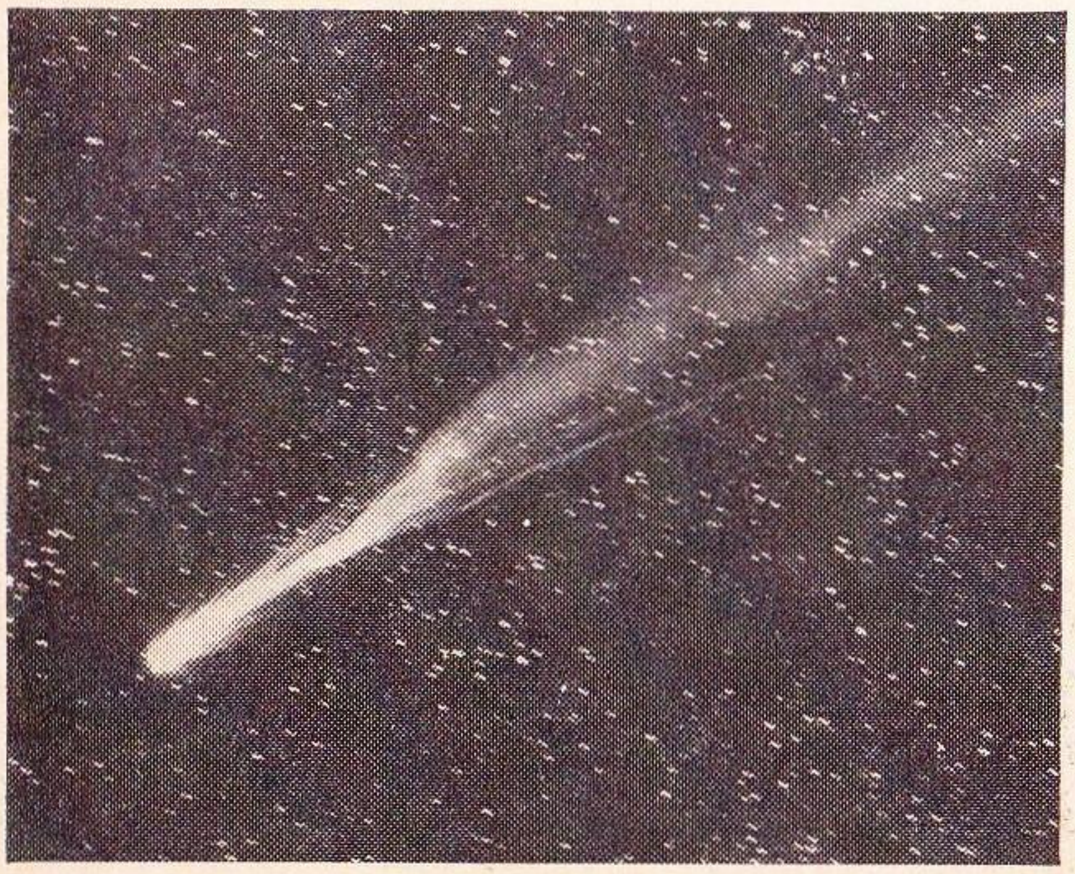




(PHOTOGRAPH: AMERICAN MUSEUM OF NATURAL HISTORY, N. Y.)

which there were no large comets also marks the time interval during which astronomical photography reached a usable status. Hence we don't have any photographs of any really "good" comet—not even that of 1882. We have to rely on contemporary drawings when we try to visualize the fantastic beauty of Donati's comet of 1858 with its majestic curved tail, accompanied by two fainter and much straighter tails. The same goes, of course, for the Great Comet of 1843, with its enormous straight tail reaching across a third of the sky, not to mention Cheseaux's comet of 1744 which displayed a bundle of six major tails and a number of minor ones. It must have looked like a large searchlight battery in action.

The only comet which many persons living might still be able to remember is Halley's comet of 1910, but comparing the recorded—and, incidentally, photographed—performance of Halley's comet on that occasion with what is told of earlier appearances it must have made a poor showing.

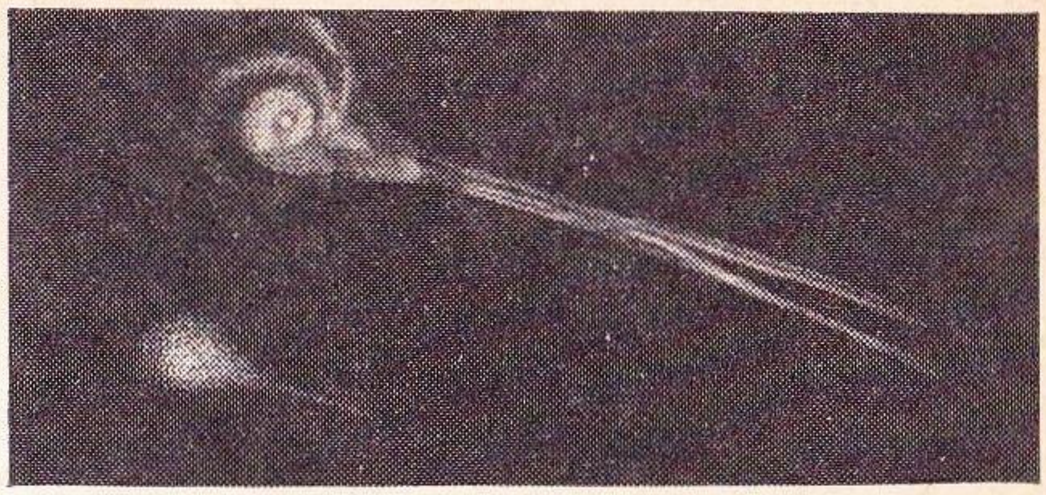
Top: Halley's Comet, as photographed by the Yerkes Observatory on May 4, 1910. The length of the tail at that time was about 8 degrees.

Middle: Comet 1947 N, photographed December 14, 1947 at Canberra, Australia. It was the brightest comet for several decades, with a tail ten million miles long.

Bottom: Morehouse's Comet (1908 III) photographed November 16, 1908. The separate streamers of the tail were clearly visible.

Since then there have been comets galore, half a dozen and more per year, but all faint objects, accessible only to the telescope and the astronomical camera. Although a number of them, say one every second year on the average, have been listed as "naked-eye comets" that listing, unfortunately, merely meant it could be seen without a telescope. It could be seen, that is, as a faint washed-out looking star, provided you knew precisely when and where to look for it.

It is true that, because of lack of celestial fuel, the traditional fear of comets must have largely died out although it presumably still lingers in the minds of many older persons. Where there is no comet there is nothing to be afraid of. And the fact that the world did not go up in flames, or die of acute comet tail poisoning in 1910 must have contributed a good deal. There must have been a great deal of excitement on that occasion—for though I don't remember Halley's comet myself I do remember that there was much talk about it. Since I



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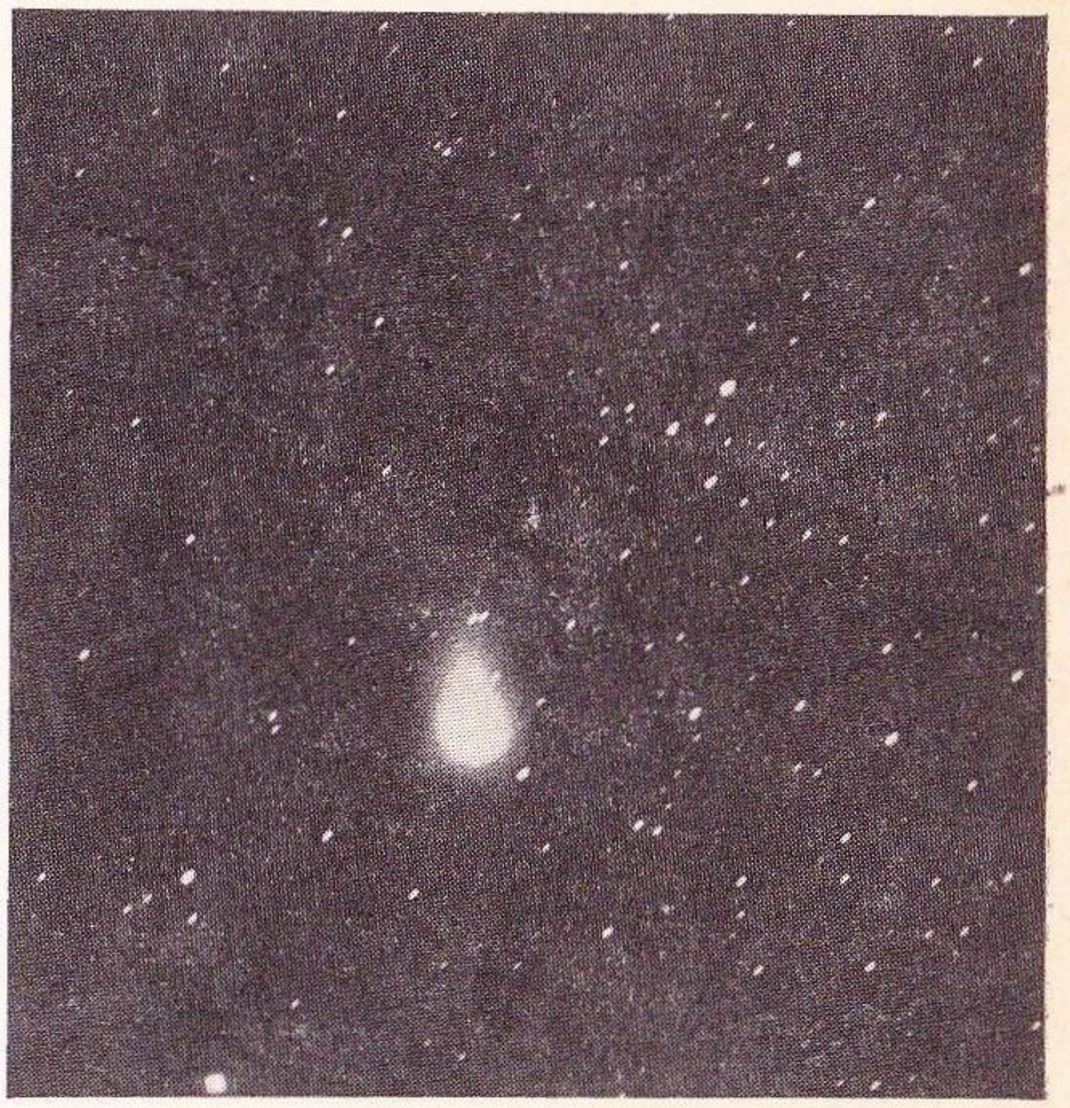
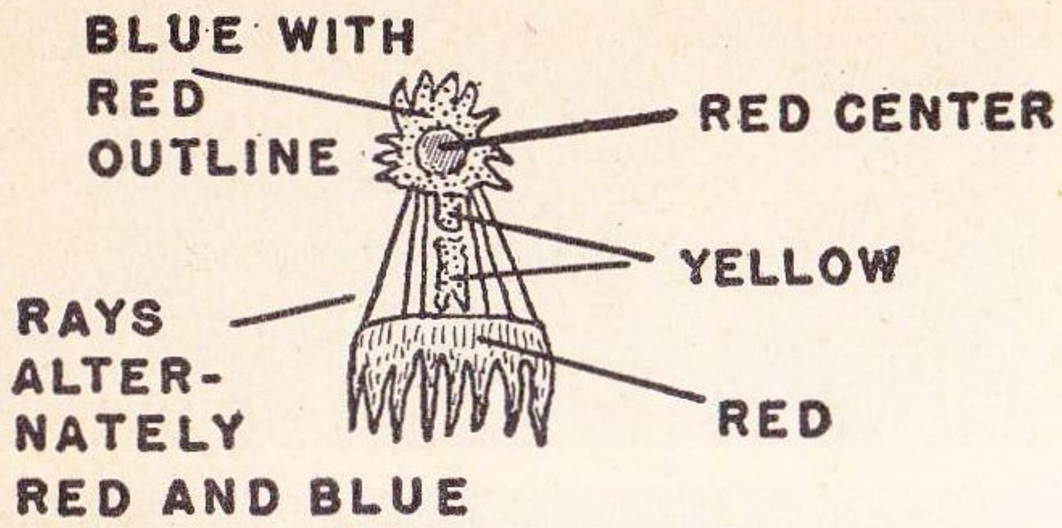


(PHOTOGRAPH: AMERICAN MUSEUM OF NATURAL HISTORY, N. Y.)

Top: Biela's comet, UPPER: As seen in February 1846 shortly after it split in two. LOWER: As drawn during its last observed approach to the sun in September 1852. By that time Biela's comet had lost most of its mass.

Middle: Peltier's comet during one of its recent returns. Tail just begins to develop.

Bottom: Daniel's Comet (1907 IV) on July 17, 1907. The length of the dashes, caused by the apparent movement of the fixed stars while the camera followed the comet—shows that this was a very faint object.

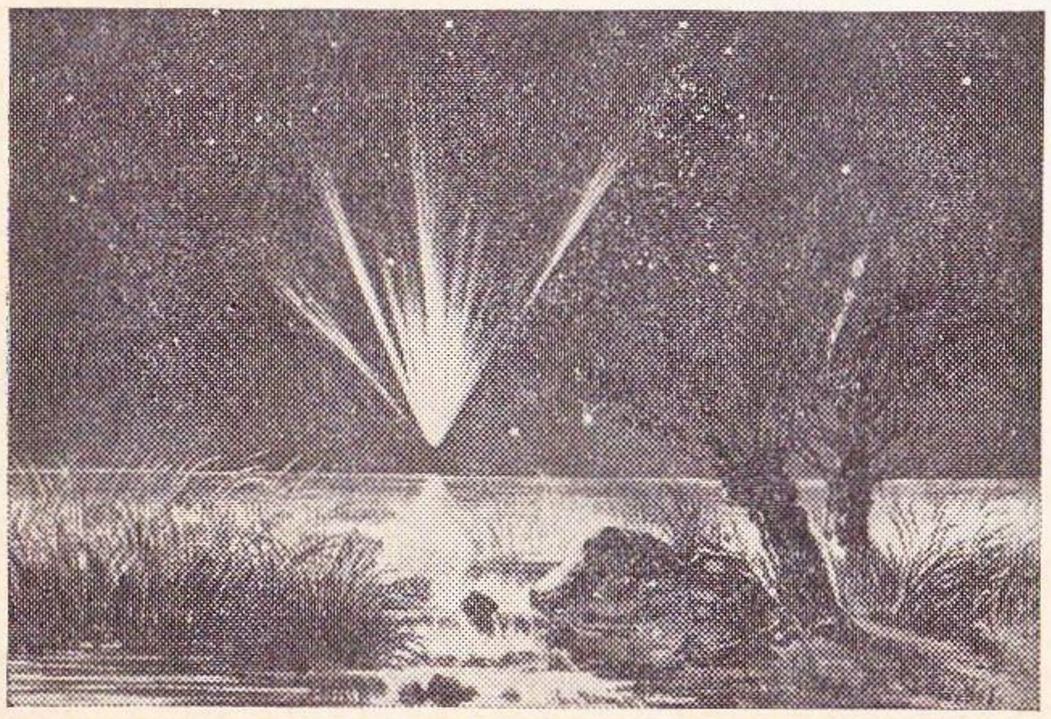


Halley's Comet, as it appears on the Bayeux Tapestry. Perhaps not a striking likeness, but the oldest comet picture known.

was precisely three years and eight months old in May 1910 it must have been impressive. In particular I remember a few impressions of a family visit to friends; I can recall that "the comet" dominated the conversation of the grown-ups—they probably talked terrible nonsense—and after dark everybody went down to the canal for a view of the sky. Of course nobody saw the comet.

Judging from some books I have read later this must have been typical and it is quite significant that those

The Great Comet of 1861 (1861 II) as drawn on June 30th of that year. The loss of two tails is clearly visible; that comet must have expended a large portion of its gas-producing components during that particular perihelion passage.



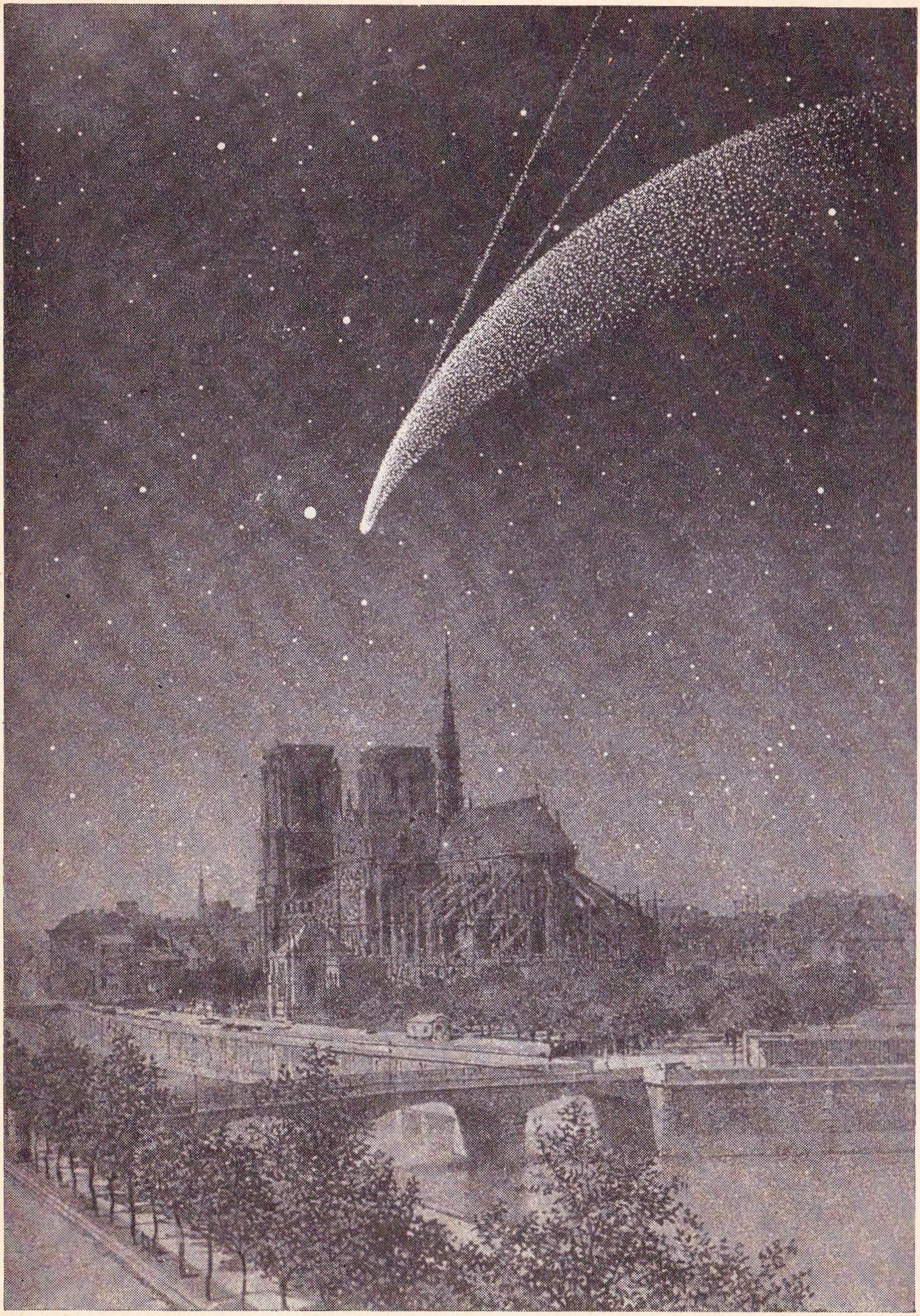
(PHOTOGRAPH; AMERICAN MUSEUM OF NATURAL HISTORY, N. Y.)

books, popular pamphlets intended for mass consumption, uniformly stressed certain astronomical facts. Comets are far away, they said, their tails are far more tenuous than even a light fog; even their heads do not seem to be solid; there have been so many comets in the past and the earth is so old that *if* comets could do damage to the earth they would have done it a long time ago, presumably before there were any people on earth to worry about comets. Since all this was obviously in reply to then current rumors, those rumors must have been juicy indeed.

Comets, because of the irregularity of their appearance in time and the singularity of their appearance to the eye, have been responsible for the maximum exertions of the human imagination. It worked in both directions: toward extreme superstition and nonsense on the one hand, and toward magnificent feats of reasoning on the other.

Both, however, were slow in starting. Probably because comets had neither periodicity nor recognizable paths across the sky the earliest astronomers, the Egyptians, seem to have treated them with severe neglect. At any event Lucius Annaeus Seneca, who died in 65 A.D. and who was probably the most logical and least credulous of the writers of the Roman period, felt sure that the Egyptians had not considered them part of their

How the imaginative illustrator of a British magazine pictured the coming passage of Halley's comet in 1910. The reality was roughly one per cent as impressive as this "forecast."



astronomy. As regards the other early astronomers, the Chaldeans, Seneca quoted Epigenes as having stated that the Chaldeans took them to be fiery eddies of air.

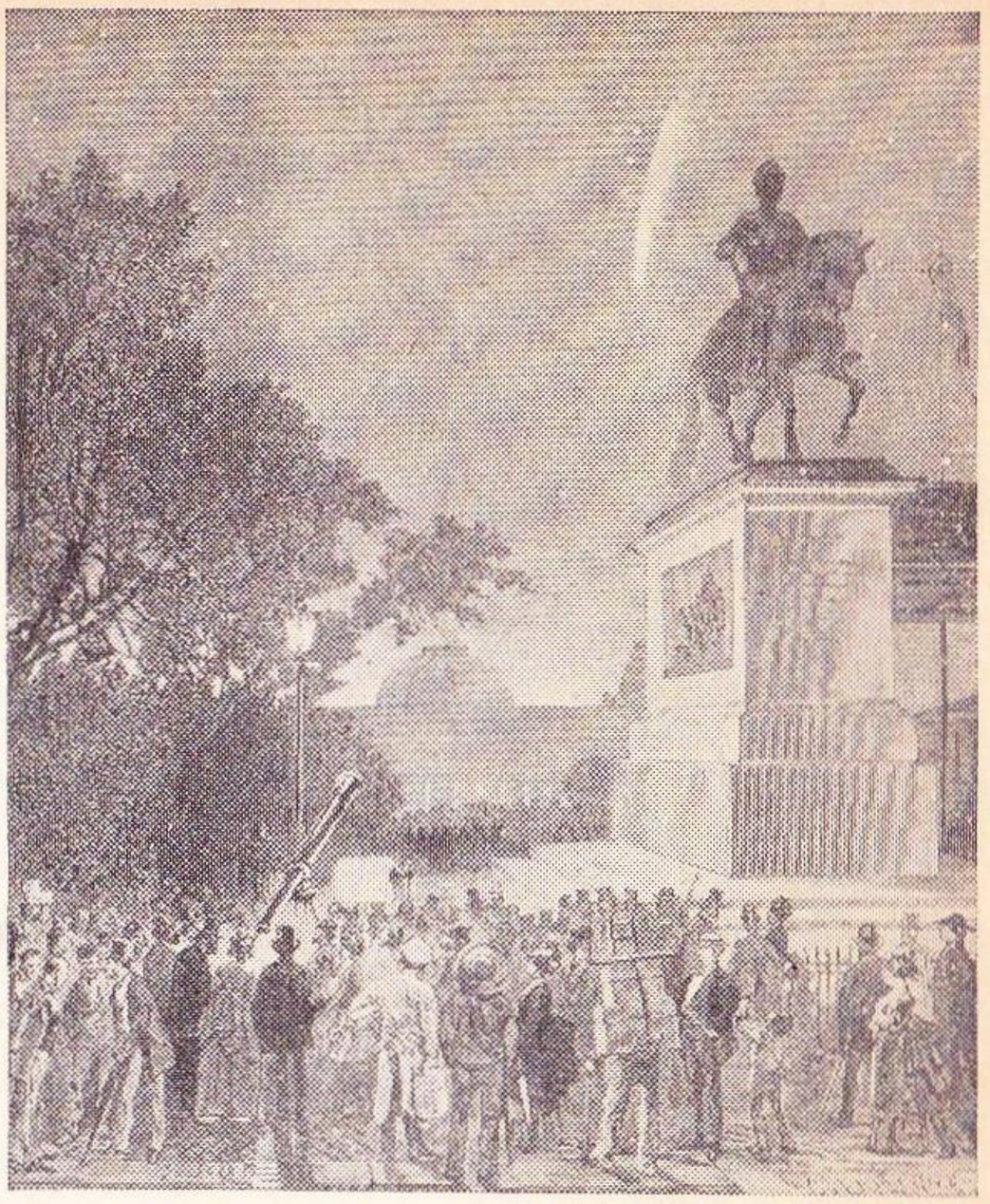
If Seneca quoted Epigenes correctly, and if Epigenes had reported the Chaldean views correctly, Aristotle just accepted the Chaldean beliefs as regards comets. But he did give reasons of his own. Some Greek philosophers, for example Anaxagoras and Democritos, he said, had taken comets to be astronomical phenomena like the planets. But that could not be true. In the first place no planet had ever been observed but the known five—meaning: Mercury, Venus, Mars, Jupiter and Saturn—and they had often been seen above the horizon all at the same time. But comets had been visible in addition to them. Also, comets had "vanished without setting, gradually fading away above the horizon" without leaving a star. But if they were what the others said, one should see comets without tails. In short, they did not fit into the astronomical picture anywhere, hence they could not be astronomical phenomena.

And then he drew his conclusion: "We may say, then, that a comet is formed when the upper motion introduces into a gathering of this kind a

(PHOTOGRAPH: AMERICAN MUSEUM OF NATURAL HISTORY, N. Y.)

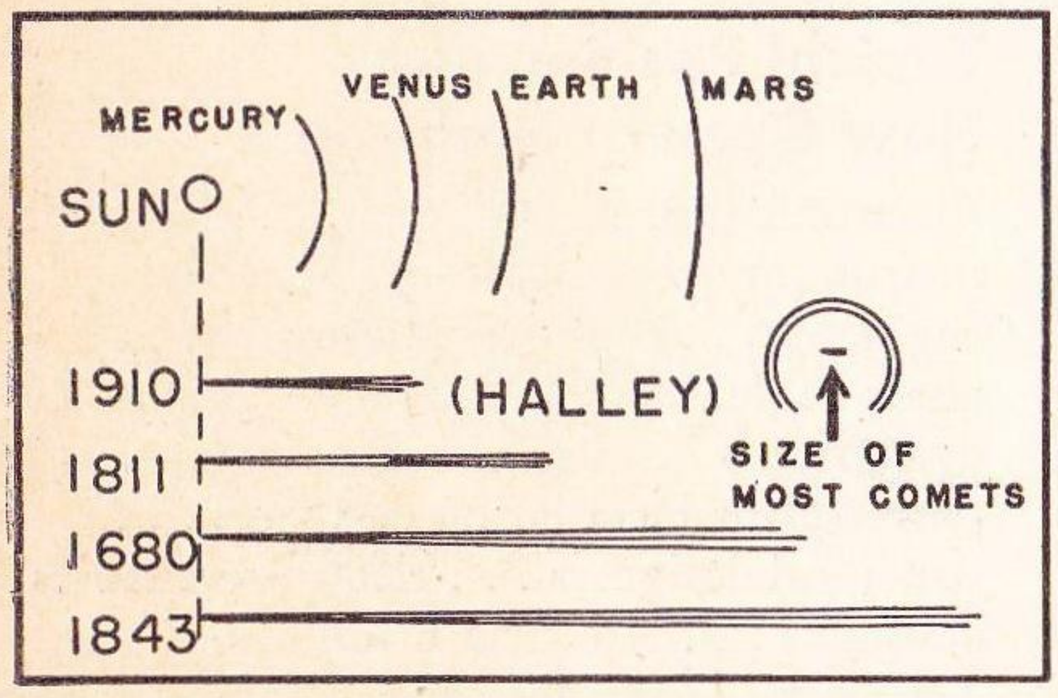
Comet Donati (1858 VI) as drawn in Paris early in October 1858. Note the relative positions of the comet's head and the bright fixed star in this drawing and the one on Page 83.

fiery principle not of such excessive strength as to burn up much of the material quickly, nor so weak as soon to be extinguished, but stronger and capable of burning up much material, and when exhalation of the right consistency rises from below and meets it." In short: comets were just fires in the air, vapors that rise from the ground and are burned, provided they burn slowly for if they burn up fast they form just "shooting stars." Logically then, since comets are burning vapors from the ground "when there are many comets . . . the years are clearly dry and windy." There are



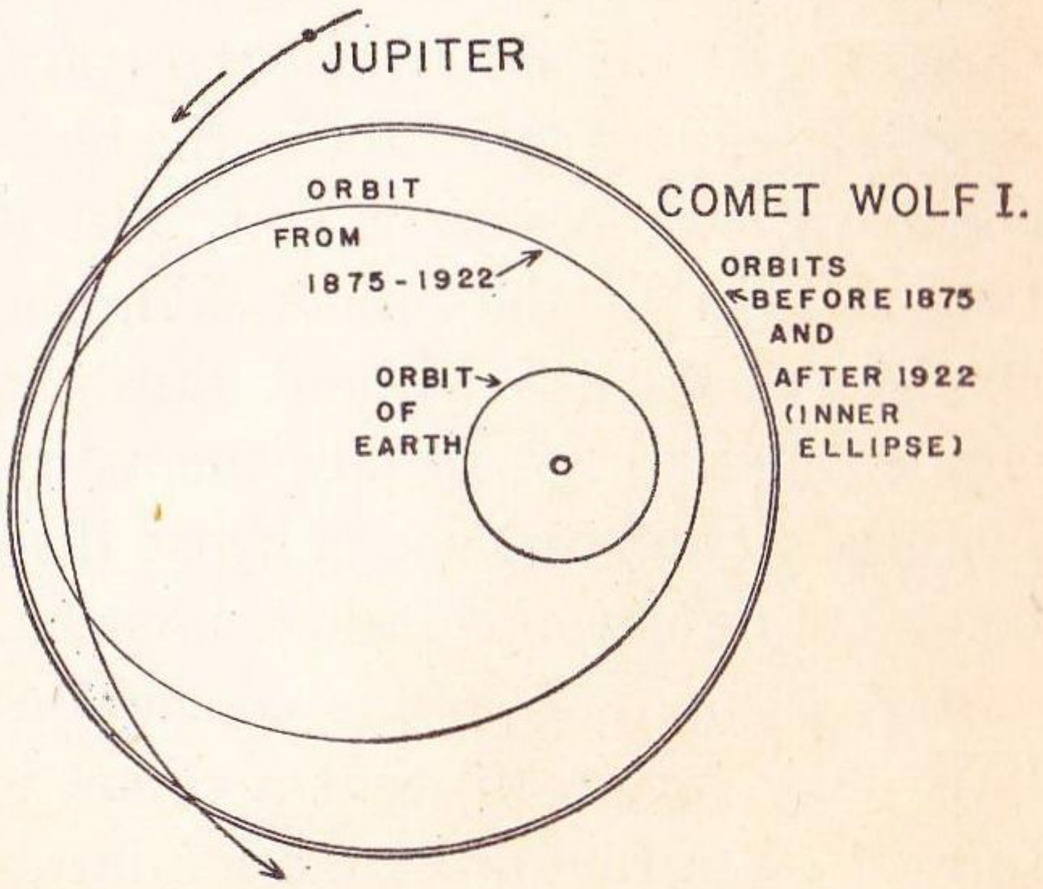
(PHOTOGRAPH: AMERICAN MUSEUM OF NATURAL HISTORY, N. Y.)

Coggi's comet of 1874 as seen from the Pont-Neuf in Paris.



Several of the real large comets of the past, with the solar system for scale. Anything after 1910 was of the size of the one indicated by the arrow.

examples, too, "at the time of the great comet (of 371 B.C.) the winter was dry and north winds prevailed"; there happened to be an earthquake and a tidal wave in that year and Aristotle thought that the tidal wave had been caused by the strong winds. "Again," he continued, "in the archonship of Nicomachus (341–340 B.C.) a



The strange case of Comet Wolf I. Prior to 1875 the comet moved quite some distance from the sun, with a period of 8.5 years. Then Jupiter forced it into a shorter orbit with a 6.8 year period, but in 1922 Jupiter changed the comet's orbit again, throwing it back almost into its original orbit.

comet appeared . . . and simultaneously with it there happened the storm at Corinth."

Aristotle's statements were directly responsible for two entirely different later developments. He had taken the comets to be "weather signs," indicating strong and dry winds and although his reasoning was essentially that the winds caused the comets that was soon turned around. The comets caused strong winds; strong winds were destructive and "bad"; comets prophesy bad things. The frantic comet fear of later centuries goes back to Aristotle's attempt to use them as weather prophets. On the other hand, since comets were merely atmospheric phenomena, they were largely neglected in astronomical studies. Their presence was noted, but they were not properly observed and the result was that later astronomers had to dig for comet data in Chinese literature which is not a very easy task.

There were some men, especially Seneca who has already been mentioned, who did not agree with Aristotle's interpretations. But little attention was paid to them and it happened that Pliny the Elder seems to have been unacquainted with Seneca's views on comets. Consequently Pliny mostly reiterated Aristotle's ideas. And since Pliny's "Natural History" became, for many centuries, *the* book to which scholars turned for information, Aristotle won out all along the line.

Pliny had not insisted that every comet was a prophet of doom. He mentioned that one of them was taken to be a sign that Caesar had been admitted among the immortals. But most of what he had told admitted of a gloomy interpretation and the following centuries went to work on that with a morbid glee. A comet, later theologians announced, was a torch ignited by the Lord to show His displeasure and to announce punishment. Since wars, invasions, famines and epidemics were even more frequent than comets in those days, it was ridiculously easy to cite long lists of awful examples to prove the point. The continuous fear seems to have reached a feverish pitch when a large comet appeared in the sky in 1456, just three years after the Turks had conquered Constantinople.

Later legend has it that the Pope, Calixtus III, issued a bull excommunicating the comet. What really happened is that the Pope ordered supplications and that church bells be rung to call the faithful "to aid by their prayers those engaged in battle with the Turk."

While some astrologers of the period began to reason that not every comet means bad luck for every one and that one had to consider its position in the sky and the horoscope of the individuals—and, after all, bad luck in battle for one means good luck for the other—the great mass of the population could not be bothered with such refinements. In the German-speaking

areas of Europe there circulated a doggerel—(still known to everybody in 1910—that a comet in the sky meant eight things:

Wind, Teurung, Pest, Krieg, Wassersnot, Erdbeben, Aendrung, Herrentod

(Storm, famine, pestilence and floods, earthquakes, changes and a ruler's death)

It is true that just the fifteenth and sixteenth centuries brought a never duplicated rash of conspicuous naked-eye comets. There was one in 1402, one in 1433, then in 1449, then in 1456—that was Halley's—two in 1457 and one in 1472. The list for the sixteenth century is almost incredible. There were bright comets in 1500, 1506, 1531—Halley's again—two in 1532, 1533, 1538, 1539, 1556, 1558, 1569, 1577, 1580 and 1582. It was just this superabundance which brought astronomical results. It also must have weakened the fear to some extent, because after the bright comets had all disappeared the earth was still intact and humanity even in a somewhat better shape than it had been before. Some courageous characters even burst into print with the contention that there was no connection between comets and kings, as for example one Giovanni Ferrerio who published his treatise in Paris in 1540.*

The first important astronomical discovery was made, almost simultaneously and certainly independently, by two men. One of the two was Girolamo Fracastoro who, as a young man, may have met the young Copernicus in Padua during the years from 1501–1506. He announced, in a book published in Venice in 1538, that the tails of comets are always turned away from the sun. The other man was Peter Apian, professor of mathematics at Ingolstadt and astronomer to the two emperors Charles V. and Ferdinand I. Apian had come to the same conclusion and published it in 1540.

The next important astronomical discovery with regard to comets was made during the same century by Tycho Brahe. There was a bright and beautiful comet in the sky in 1577 and Tycho Brahe undertook to measure its distance. He had observed the comet from the Danish island of Hveen. Tadéaś Hájek, or, latinized, Thaddaeus Hagecius, had observed the comet from Prague. Hagecius believed it to be below the moon; but when Tycho Brahe compared the observations he found a difference of only about one minute of arc. That obviously put the comet far outside the moon's orbit. After this no doubt startling discovery Tycho really went to work. The head of the comet was more than four times as far from the earth as the moon and since the distance to the moon is not quite fifty

* It bore the strong title: *De vera cometae significatione contra astrologorum omnium vanitatem;* "On the true meaning of comets; against all astrological vanities."

thousand German miles* that gave a distance of two hundred thousand German miles for the comet. The length of the comet's tail, then, was seventy thousand German miles, the greatest width of the tail five thousand German miles and the diameter of the head four hundred sixty-five German miles.

We now know that all these figures are very small, but they were large enough to do what could have been done fifteen hundred years earlier: namely to remove comets from the atmosphere and put them where they belong, in interplanetary space.

As you know it was Tycho Brahe's pupil Johannes Kepler who, only a short number of years later, discovered that the planets do not move in circles around the sun but in ellipses. But while Kepler established the laws of planetary movement he failed to improve on the theory of comets. He took every comet to be a one-time visitor to the sun and believed that their orbits were simply straight lines. It was just one century after Tycho Brahe's feat that the orbit of a comet was calculated for the first time. The comet was the very bright and very large comet of 1680; the calculation was made by an "amateur," Pastor Georg Samuel Dörfel of Plauen in Saxony, Germany. The comet's orbit, he said, was a parabola, coming from infinity and going back to infinity, with the sun as the focal point.

At the time that comet appeared, Dr. Edmond Halley was twenty-four years old; he must have seen it and it probably aroused his interest in comets. Some time later, in 1705, he published his study of the orbits of twenty-four comets. When he began his work he probably just wanted to establish the orbits of all the comets which had been observed carefully enough for this purpose. But then he saw something intensely interesting, there were three comets which had the same orbit! "Many things," he wrote, "lead me to believe that the comet of the year 1531, observed by Apian, is the same as that which, in the year 1607, was described by Kepler and Longomontanus, and which I saw and observed myself, at its return, in 1682. . . . I may, therefore, predict its return in the year 1758. If this prediction is fulfilled, there is no reason to doubt that the other comets will return."

This prophecy was the crowning touch of a long and slow development which changed the comets from burning vapors to one-time visitors to the sun and, finally, to regular members of the solar system, running in regular orbits. It is interesting to look at a small table of figures which caused Dr. Halley's prophecy, but first a

* Like everything else in those days the length of the German mile was not standardized. The one which Tycho Brahe must have had in mind was 4.5 English miles, with seventy-two hundred meters to the German mile. The later standardized German mile—no longer in use—measured seventy-five hundred meters.

few terms have to be explained. In any orbit there must be a point which is closer to the sun than any other point of the orbit. That is the perihelion—the opposite, the farthest point from the sun, is the aphelion. In the following table the top line, the dates, give the date of perihelion passage of the three comets. The next line gives the position of the perihelion, the third line the distance of the perihelion in Astronomical Units—one Astronomical Unit or A.U. is the distance of the earth from the sun; the fourth line gives the inclination of the comet's orbit to the plane of the earth's orbit, the ecliptic. The last line, finally, is the direction where the comet's path cut through the ecliptic.

Here's the table:

	COMETS OF		
	1531	*1607*	*1682*
(1).....	Aug. 26	Oct. 27	Sept. 15
(2).....	301° 12′	301° 38′	301° 56′
(3).....	0.5799	0.5880	0.5820
(4).....	17° 0′	17° 12′	17° 45′

In addition to that all three comets were retrograde, meaning that they moved opposite to the general direction of movement in the solar system. The only noticeable discrepancy was that there had been an interval of 27,811 days from 1531 to 1607 and an interval of 27,352 days between 1607 and 1682.

After Dr. Halley had ventured to *predict* a comet—up to then only the alleged but dire consequences of a comet had been predicted—nothing remained to be done but wait and see what would happen. The year was to be late in 1758, possibly early in 1759. Dr. Halley himself died in 1742, he had reached an age of eighty-six years but he could not grow quite old enough to see "his" comet a second time. Astronomers, who had meanwhile convinced themselves on theoretical grounds, waited for the re-appearance of the comet.

But the first man to see it was again an amateur, a well-to-do peasant by the name of Johann Georg Palitzsch who spent his evenings reading books on botany, trigonometry and physics. He discovered the return of Halley's comet with his small private telescope during the Christmas night of 1758. On January 21, 1759 Messier in France found it too. The comet passed perihelion on March 12th and remained visible until the end of May of that year.

Now, that the periodicity of at least that one comet had been proved, astronomers went to work on all available records, trying to establish which comets of the past had been Halley's. Back to about 1200 European records were available, for the earlier times it was necessary, as has been stated, to consult Chinese records.

The earliest perihelion passage of Halley's comet that could be established was for the year 240 B.C. based on Chinese sources. There is an earlier Chinese record for the year 467 B.C. which would fit the period of Halley's

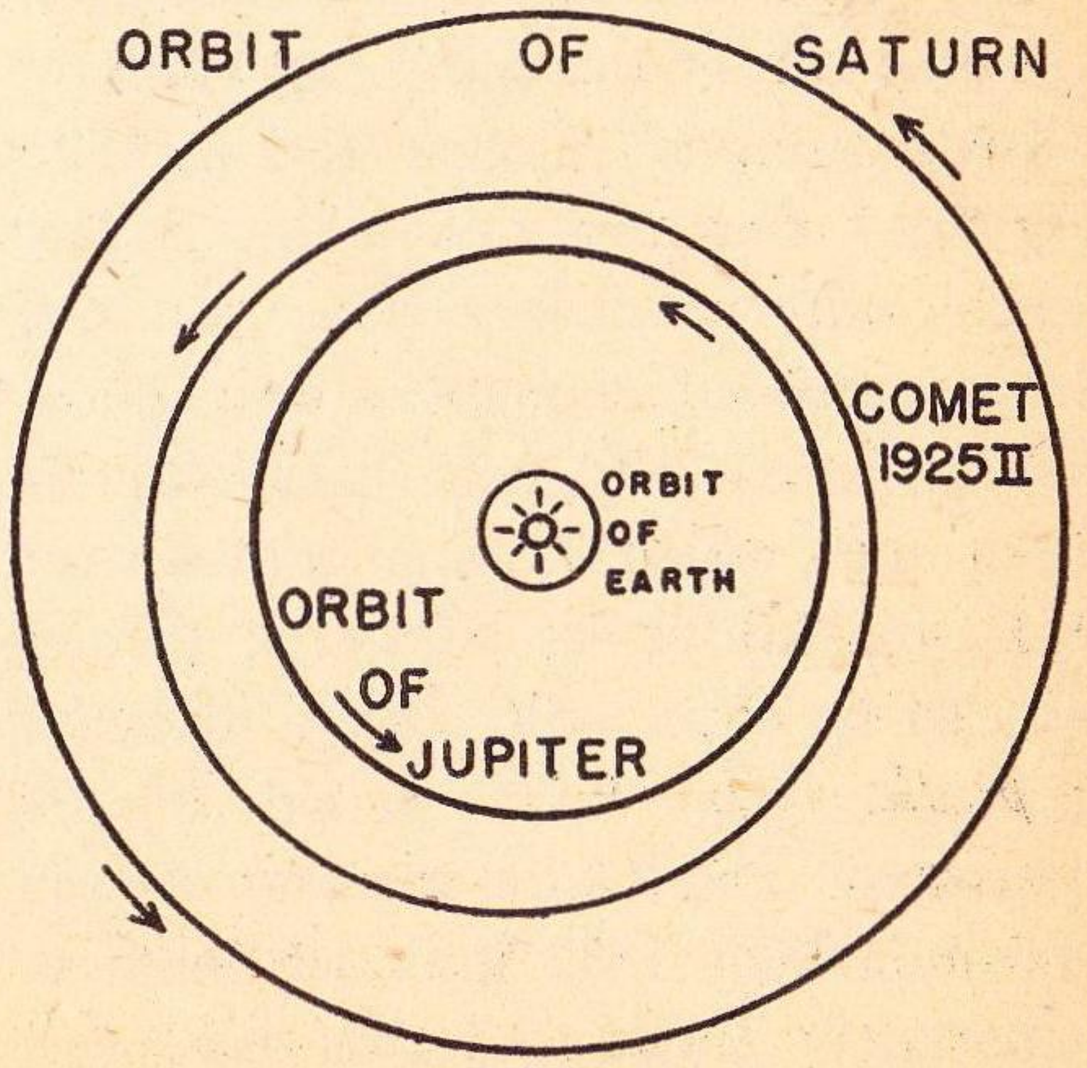
comet, but the observations are not clear enough to establish the orbit even approximately so that that date is quoted with a question mark. The next appearance after 240 B.C. should be 163 B.C. But no bright comet was seen in that year, although there were bright comets in 166 B.C. and 165 B.C. The comet of 11 B.C. was Halley's which could be proved. And from then on the record is without gaps. In 66 A.D. it was visible for seven weeks, in 141 A.D. for four weeks, in 218 A.D. for six weeks, in 295 for seven weeks. Next appearance was in 373 A.D. and the next one after that in 451 A.D. when it was visible for thirteen weeks. That was the year of the Battle of Chalons, when Attila and his Huns were decisively beaten —hardly a bad thing for the Western World. As for the re-appearance of 607–8 we aren't quite sure, there were two comets in the sky then, one of which must have been Halley's.

In 684 it was visible for five weeks, in 760 for eight weeks. In 837 it had much competition, the Chinese list four different comets for that year, the first of them was Halley's. There were re-appearances in 912 and in 989. The next re-appearance, that of 1066 has a special fame attached to it. It was the year of the Norman conquest of England and the Bayeux Tapestries—more properly embroideries—show the comet too. There is not much reference to it otherwise, the Tapestry merely shows the comet in the sky and a number of men looking at it with the inscription *Isti mirant stella(m)*—"these marvel at the star"—nothing else. It is, however, not only the first picture of Halley's comet but the oldest known comet picture in general. Highly stylized it has little pictorial value, although it may be taken to signify that Halley's comet had several tails in that year.

In 1145 it made a poor showing, was somewhat brighter in 1223 and brilliant for six weeks in 1301, poor again in 1378 and quite conspicuous in 1456. The next re-appearance after that date was 1531, then 1607, 1682 and 1758–9 which clinched the case.

The next date was 1835 and Halley's comet did come back from the distant

Not all comet orbits are highly eccentric ellipses. Comet 1925 II has an orbit good enough for any planet. If it did not flare up occasionally for unknown reasons, we would not know of its existence since it never developed a tail.



aphelion of its orbit, some distance beyond the orbit of Neptune. But, strange to say, many people did not look forward to that date with anticipation, but rather with apprehension. There had been a somewhat earlier crisis in France. Somebody had started the rumor that astronomers had calculated that a comet would collide with the earth, and destroy it, on the 12th of May 1773. But that the king's police had requested the savants to keep quiet about the coming end of the world. Nothing had really happened, of course, but the old comet-fear had received a new lease on life. Maybe comets did not *mean* catastrophes in the old sense, but, moving erratically through space, they might *cause* catastrophes. And such a catastrophe seemed to be approaching.

In February 1826 Herr Wilhelm von Biela, a captain in the Austrian army, had discovered a faint comet. He did not suspect that it was not really new and that it had been seen on two earlier occasions, in 1772 by Montaigne and Messier and in 1805 by Pons, Bouvard, Olbers and Schröter. Then the observations had not been extended enough to establish a reliable orbit. But von Biela followed the comet, which was then named after him, for twelve weeks and it turned out to be a periodic comet with the comparatively short period of six years and about nine months. It was due again in 1832 and astronomers innocently announced that the head of Biela's comet would then go through the earth's orbit.

But the newspapers and the public overlooked the word "orbit." They did not realize that the earth, while also in its orbit, would be some fifty million miles from the point where Biela's comet made its crossing. They predicted collision, catastrophe, ruin, "the end." Joseph Johann von Littrow, director of the Vienna Observatory, had to issue what amounted to a proclamation to stop the panic. Of course Biela's comet completed its round in 1832 without doing anybody any harm. So did Halley's comet in 1835. And Biela's in 1839—it did not become visible then because it stayed in twilight. Next return of Biela's comet was scheduled for the first months of 1846. It did return, but accompanied by a nebulous spot which then developed into a second comet. Quite evidently Biela's comet had split in two. At the next return, in 1852, the twin comet was observed again, the two parts separated by a much longer distance than six years earlier. The return after that, 1859, was not favorable for observation, but the next one, in 1866 was. Or better—should have been.

For, although all observatories which did not happen to have cloudy skies strained all their instruments, nobody found it. Biela's comet had simply disappeared.

But just in that year an interesting

announcement came from Italy. Giovanni Virginio Schiaparelli, later famous for his discovery of the *canali* of Mars, reported that he had found the orbit of a periodic shower of shooting stars. Because they seemed to originate in the constellation of Perseus they had been called Perseids. But their orbit was the same as that of another short-period comet, called Tuttle's comet. Two other astronomers, H. I. d'Arrest and E. Weiss, took the cue and announced—again simultaneously and independently—that a shower apparently originating in Andromeda ran in the orbit of the now missing Biela comet.

Weiss then calculated when the earth would pass through the old comet orbit again, it was to be late in November 1872. And the comet, or fragments of it, appeared, as a shower of shooting stars such as has rarely been seen. At Moncalieri in Italy four observers counted 33,400 in six and a half hours; at Göttingen in Germany 7651 were seen in less than three hours. (In America it was daylight when the earth passed through the stream.) There could be no doubt any more that the so-called Andromedes were actually fragments of Biela's comet and they were re-named Bielids.

Other such associations were established then: the Lyrids—from the constellation of Lyra—turned out to be associated with comet 1861 I. The Leonids—from the constellation of Leo—were associated with comet 1866 I. Halley's comet accounted for even two showers, the Eta Aquarids in May and the Orionids in October. And quite recently Fred L. Whipple identified the Taurid meteors with Encke's comet, the comet with the shortest period known, only 3.3 years.

Nor was Biela's comet the only one to be disrupted in full view of the astronomical world. Taylor's comet divided in 1916 and was never seen again. Comet 1926 III—Ensor's comet—suddenly became very diffuse when it neared its perihelion—of only one third of an astronomical unit—faded and disappeared. Comet Westphal, although its perihelion is outside the earth's orbit—at 1.25 A.U.—had done the same in 1913. These comets were torn to pieces by the sun's gravitational field, but Biela's comet had apparently been disrupted by Jupiter when the comet passed the planet in 1842.*

One point which puzzled astronomers was this: they had large collections of meteorites, whole museums full of them, ranging in individual size from tiny pebbles to thirty-ton monsters. But not a single one of these recovered meteorites was associated with any of the showers that originated from comets! Apparently comets did not contain anything large enough to sur-

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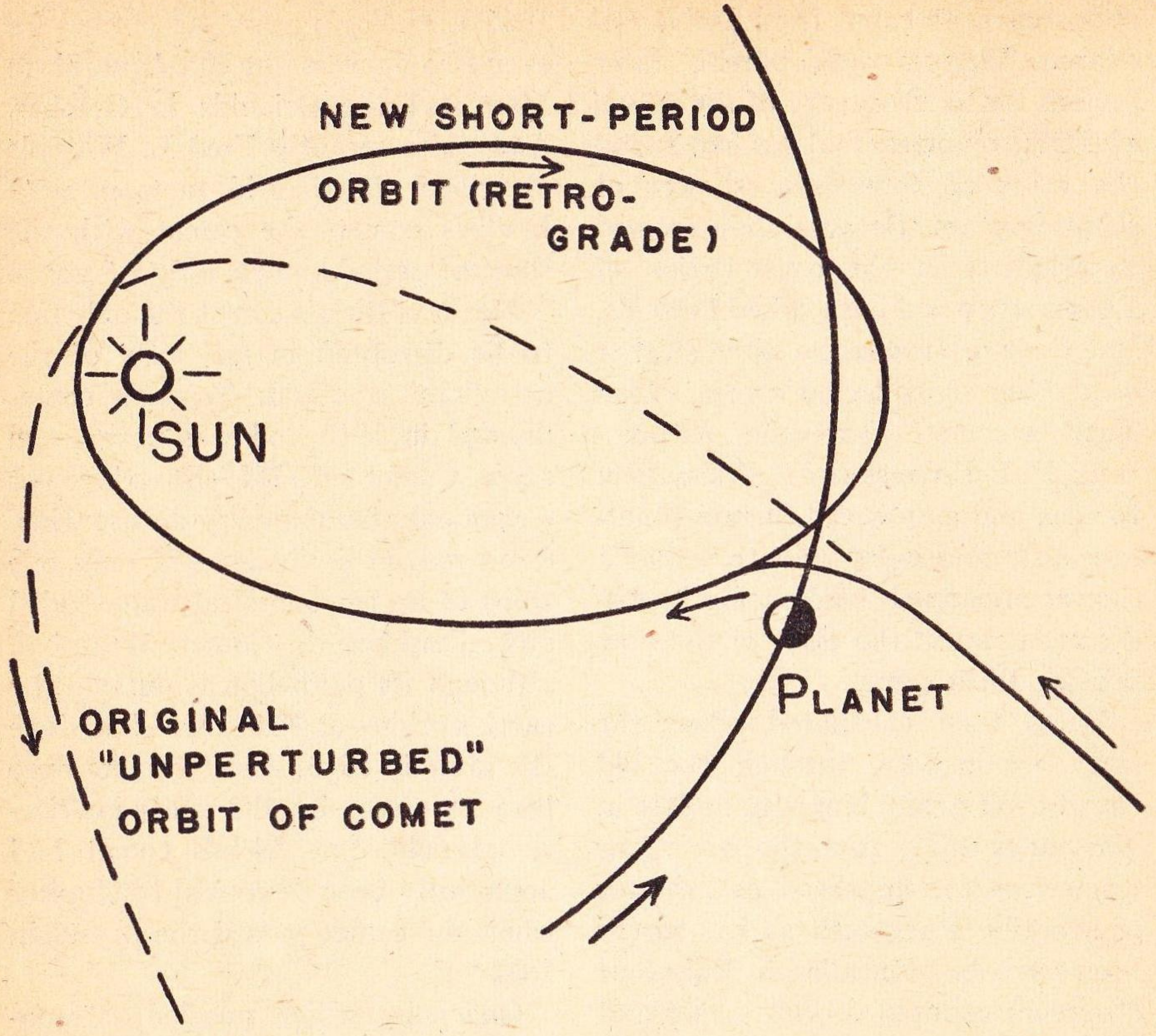
* The oldest example of such a disruption is the comet of 371 B.C. described by the historian Ephorus of Cyme. This fact has been preserved for us by Seneca, who chided Ephorus as an unscrupulous chronicler who did not hesitate to invent falsehoods to improve his stories!



How a planet, by retarding a comet's movement, can change a long-period orbit into a short-period—and incidentally retrograde—orbit.

vive passage through our atmosphere and reach the ground.

If it had not been for a lucky find made by Dr. H. E. Landsberg of Washington D. C. in 1946 we would, still have to say that no comet débris ever reached the ground. But Dr. Landsberg, after the Giacobinid shower of October 1946—so named after the comet Giacobini-Zinner, 1933 III—found six particles, averaging 1/6000th of an inch in diameter, quite heavy and consisting largely of iron. Dr. Fred L. Whipple proved mathematically that these micro-meteorites had the optimum size for surviving the passage through the earth's atmosphere, too small to be broken up, too large to burn up completely. So far these six specks, hardly visible, are all the unquestioned comet material we have—hardly what the sensationalists of a

hundred or even of fifty years ago expected to come out of a comet.

The whole story of comets has always revolved around two main questions: what are they and where do they come from?

Let's take the second question first and begin with an examination of such orbits as are possible at all. Theoretically a comet can move around the sun in the four conic sections, circle, ellipse, parabola and hyperbola. We have already spoken about the eccentricity of ellipses which indicates their deviation from the circle. A circle has no eccentricity at all, or zero. An ellipse has an eccentricity larger than zero but smaller than "one" for when its eccentricity becomes "one" its two ends do not close in any more but become parallel, theoretically in infinity. Hyperbolas can have any eccentricity larger than "one" which means that the two "legs" will always diverge, even at an infinite distance.

This definition of a curve by its eccentricity acquires more meaning if we remember that an eccentricity of "one"—the parabola—would result from a fall of the comet from infinity. Since the sun cannot produce a higher eccentricity, a hyperbolic orbit, if we found one, would indicate that the comet had a velocity of its own before it began the fall from infinity toward the sun. A hyperbolic comet, in short, would be a visitor from another solar system.

Since a few comets did have hyperbolic orbits it used to be asserted that these were interstellar visitors. But when their orbits were investigated in detail it was found that they had not arrived in our solar system along a hyperbolic orbit. These comets had crossed the orbit of Neptune either on a long ellipse or on a parabola and it had always been the influence of one of the large outer planets that had made them hyperbolic. A planet's gravitational field can obviously do either one of two things: it can increase the orbital speed of the comet or else it can retard it. It depends solely on the relative positions of planet and comet during the latter's approach. A planet can change a long ellipse to a hyperbola—which, after perihelion passage, would throw the comet out of the solar system unless another planet intervenes on the way out—or else it can change a long ellipse to a short ellipse.

It can even change one ellipse into another one, as was demonstrated by Jupiter with the orbit of Comet Wolf I. That comet was discovered by Wolf in Heidelberg in 1884, at that time it had an orbital period of 6.8 years with its perihelion point some 1.6 A.U. from the sun. In 1922 it passed within 0.12 A.U. of Jupiter and was promptly thrown into another orbit, one with a period of 8.2 years and a perihelion distance of 2.36 A.U. When Kamienski of Warsaw investigated this new orbit

he discovered that a close approach of Wolf I and Jupiter had also taken place in 1875 and when he tried to reconstruct the orbit prior to 1875 he saw that it had been almost the same that the comet had assumed after 1922. The old orbit had been very slightly larger, with a period of 8.54 years and a perihelion distance of 2.54 A.U.

Similar orbit changes have been observed in other comets. Comet Brooks II had a twenty-seven-year orbit before 1886, acquired a 6.8 year orbit in 1889 and was changed to a 6.95 year orbit—with complete reversal—in 1921. Comet Schwassmann-Wachmann II underwent an orbit change in 1921, prior to that it had had a 9.3 year period, now it has a 6.4 year period.*

Whenever a planet changes a long-period comet into a short-period comet the aphelion of the new orbit is likely to be near the orbit of the planet which caused the change. Usually the new aphelion is slightly outside the orbit of the planet which is responsible. That way we get what is called a comet "family," consisting of comets which at one time in the past were influenced by the same planet. Jupiter thus has a "family" of more than fifty comets. The other planets have smaller comet families—but there is one such family without a planet. Eight comets have orbits of such a length that their aphelia are at a distance of roughly eighty astronomical units from the sun. There is no planet out there which we know of and that comet family, obviously, is a strong argument for at least one more planet outside of Pluto.

So far everything that has been said about comet orbits has dealt with losses rather than gains. Those comets which were once believed to be interstellar visitors and potential additions to the solar system turned out to be impending losses instead. They did not come in on a hyperbola, but they left on one, never to return. We *know* of two dozen such losses, any guess as to the true number per millennium has about an equal chance of being correct. We have "lost" another two dozen comets during the last two centuries by dissipation. At such rates there shouldn't be any left; in fact since the lifetime of a comet is virtually ephemeral when compared to the duration of even one of the shorter geological periods there shouldn't have been any comets at any time in human history and prehistory. But their numbers are still large, even though the recent crop has been poor in quality. This implies

* The names of comets are given according to a simple system. At first they are catalogued as 1951a, 1951b, 1951c, et cetera, in their order of discovery. Then, when the year is up, they are re-arranged in the order of their perihelion passage into 1951 I, 1951 II, 1951 III and so on. It could happen that 1951c becomes 1951 I, if it was the first to pass its perihelion, it could also happen that 1951g becomes 1952 I. The name of the discoverer is usually attached too, if you should see a name like Whipple VIII that would mean that it is the eighth comet discovered by Whipple.

that there must be a reservoir of comets somewhere; outside the solar system proper, but still within the gravitational field of our sun.

The fact that the most eccentric comet orbits known have an eccentricity of just about "one"—near-parabolic ellipses and possibly parabolas—agrees with this idea of a reservoir. The idea that there might be one was voiced for the first time, to my knowledge, by the Estonian astronomer E. Öpik who suggested that it might be more than one light-year distant, possibly as much as four light-years. Even if another star should pass through that swarm it would not do more than destroy a number of these comets, without disrupting the swarm as a whole.

Opik's idea was revived and amended later by Jan H. Oort of Leyden. Oort suggested that the total number of comets in that swarm might be as large as one hundred billion. Because of their long distance from the sun their temperatures would be just a fractional degree above absolute zero; the comets would be completely inactive, literally in "cold storage." Every once in a while a passing star would disturb the slow and stately orbits of a number of them so that they would fall in the direction of the sun, forming a new crop of comets.

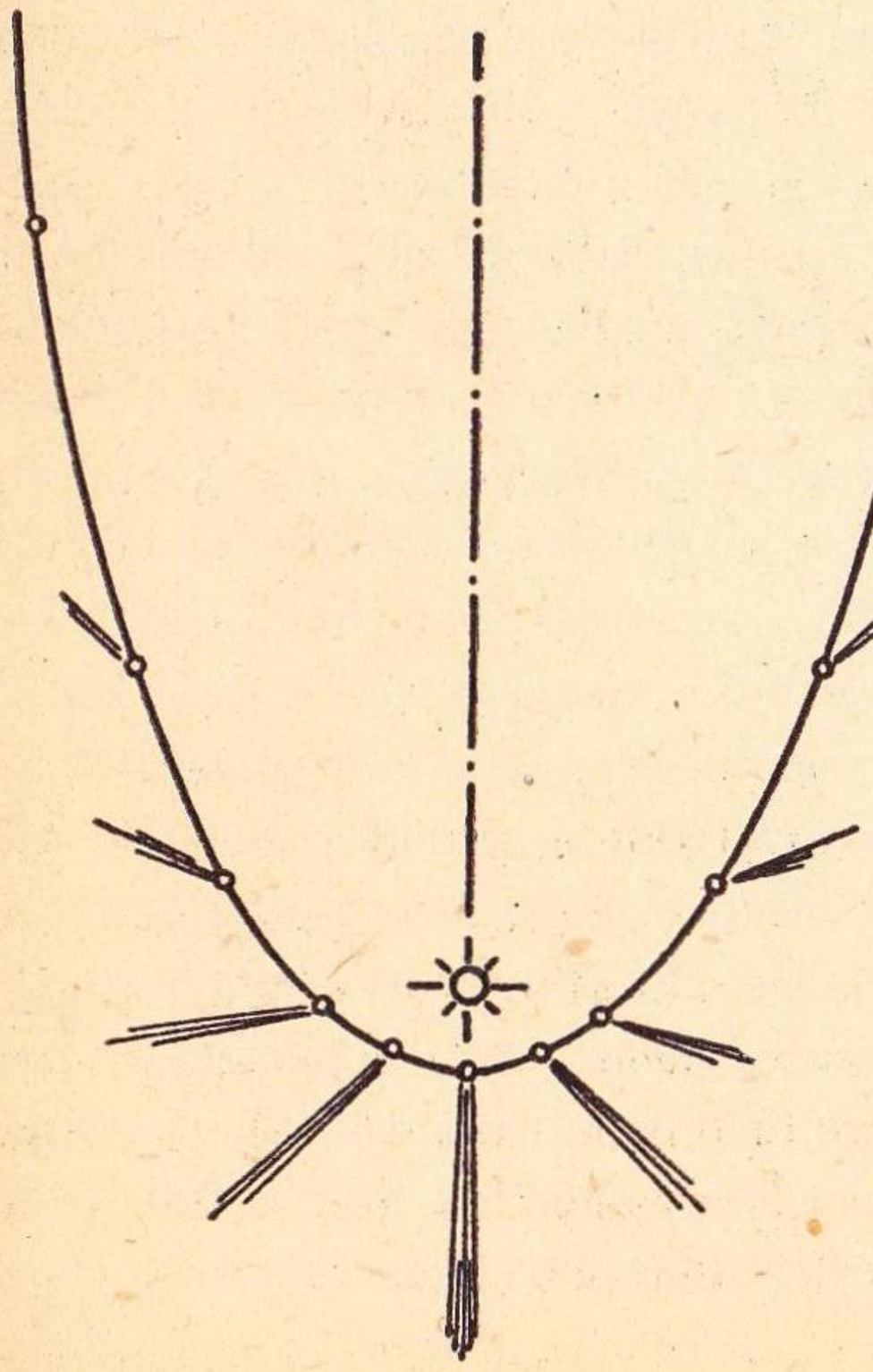
Is that what happened a thousand years or so ago, producing the rash of bright comets of the fifteenth and sixteenth centuries?

At any event the "new" comets, freshly arrived from the outer reaches of the sun's gravitational field, would become active for the first time, sending out the streamers of gases which form first the nebulous envelope, the coma, and, at about the time they pass the orbit of Mars, the long tail. After a few hundred revolutions in their new orbits, with an orbital period of less than a century, they would have dissipated their gaseous constituents and have been pulled apart into a swarm of small meteors.

Until about three years ago an astronomer, if asked what constitutes a comet, would have replied that it is essentially a shipload of gravel, with the individual pieces traveling in parallel orbits, loosely held together by their mutual gravitational attraction. In between the meteoric particles enough gas was assumed to be trapped to form coma and tail if the whole was warmed up enough by the sun. This concept did explain most of the observed facts very well but it was not quite satisfactory, mostly for quantitative reasons. The main objection one could raise was that a loose bunch of meteorites could not possibly hold enough gas to account for the oft-repeated formation of coma and tail. At least the tail is lost every time the comet recedes from a perihelion passage and quite a number of comets have been seen to lose a tail at an earlier stage and to form another one.

It was in 1940 that Fred L. Whipple reversed this concept—first publication in *Astrophysical Journal*, March 1950—and declared that a comet could not be a load of loose gravel holding some gases but that it was much more likely to be a body of frozen gases, containing some "gravel" in ultra-fine distribution. Such a comet would not only last indefinitely within Oort's comet cloud extending for one parsec around the sun, it could even originate there. The most abundant element in the universe is hydrogen. Helium comes next, then carbon, nitrogen and oxygen. Neither hydrogen nor helium will freeze solid and since helium does not combine with any other element the solid particles one would encounter in space would most likely be CH_4 (methane), NH_3 (ammonia) and H_2O (water), all, of course, in frozen form as tiny crystals. (Dr. Whipple wrote me recently that, as suggested originally by Dr. Forrest Blankenship, the hydrates of CH_4 are likely too.)

Such a body, consisting of around eighty per cent of the "ices" of the compounds mentioned and with twenty per cent or so of other meteoric material, could well form in interstellar space in the neighborhood of the sun in a sufficiently long time. If one could see one it would probably look like dirty snow. If such a body were perturbed by a passing star and then approached the sun the gases would evaporate, unequally and at different rates. They may well carry the originally imbedded micro-meteorites along with them and scatter them along the comet's orbit. If it were simple evaporation we should be able to detect CH_4, NH_3 and H_2O spectroscopically in coma and tail. The spectroscope does not show these compounds, but it does show their radicals, CH, CH_2, OH, NH and NH_2. Dr. Whipple explains this as due to the breakdown of the original compounds, caused by the action of ultraviolet radiation from the sun. In addition carbon C_2 and CN has been found

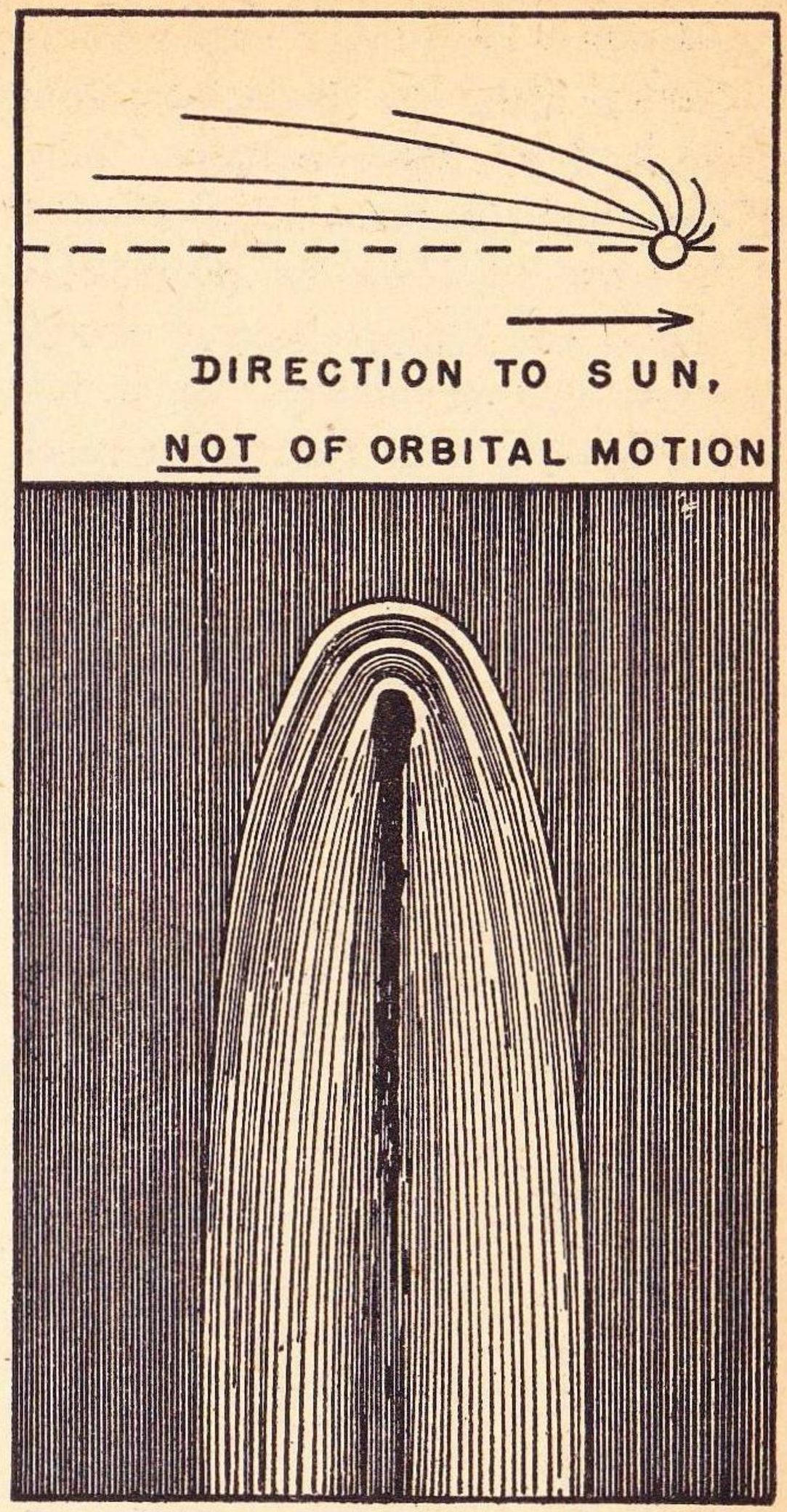


How a comet's tail sweeps around when the comet passes the sun. Most comets do not develop tails until they are inside the orbit of Mars.

spectroscopically, as well as—surprisingly—free metals such as iron, nickel, sodium and chromium. The CN was probably HCN—hydrocyanic acid—before ultraviolet went to work on it while the free metals and the carbon may just have been frozen into the body.

This comet model not only explains the observed facts which were also, if incompletely, explained by the earlier concept, it also explains something which up to now has been simply inexplicable. Comets are never on time, in the case of Halley's comet the deviation from the theoretical orbital period has been as high as four hundred days. Most of this can be explained by the gravitational influences of the various planets. But even if every planet is taken into account with the utmost care there is often a difference. Last time, for example, Halley's comet was three days late and no amount of computation could explain these three days.

Since Encke's comet, long known, has always been early by a few hours, astronomers had reluctantly accepted the supposition of a resisting medium quite near the sun, say inside the orbit of Mercury. Such a resisting medium would slow the comet a bit during perihelion passage, thereby reducing the length of the orbit a little and consequently shorten the orbital period slightly. Unfortunately, for that explanation, some comets which came very close to the sun had not been



The head of Donati's comet as drawn by Bond in September 1858.

influenced at all and others, with a perihelion passage well outside the orbit of Mercury had shown up early. Therefore the resisting medium inside the orbit of Mercury had to be dropped again. Even if it were really there it would not explain why Biela's comet was late *every time*, even while it was still in one piece.

Now if no external force—since

they have all been taken into account —could explain the deviations from the time table there remained only one possibility; namely that the comet itself must somehow be responsible for them. And Whipple's comet model has just this possibility "built in." The evaporation of the frozen gases leads to gas jets and in accordance with the Third Law of Motion the gas jets must exert a propulsive force on the comet.

Of course the evaporation takes place on the sunward side of the comet, but it would be surprising if the comet's nucleus showed no rotation at all. Therefore a gas jet which begins to form when the sun is straight up—"noon" for that point—may not become active until some time later. There are all kinds of possibilities for such a delay. A thin layer of H_2O crystals may be on top of a lump of NH_3 crystals, or there may be a layer of meteoritic material in the way. At any event when the NH_3 jet finally does break through the sun will no longer be 90° high but may be at any angle. Hence the propulsive effect of the gas jet can influence the orbit in any manner. It might also change the rate of rotation of the comet's nucleus if the jet fails to break through strictly radially.

There is, then, a propulsion effect on the comet, operating intermittently and completely at random as far as direction is concerned. Many individual jets may nullify each other but there will be a remaining component left which slightly changes the orbital elements. In one case that may make a comet early by a few hours, in another case it will make it late. It can even make the same comet late for one perihelion passage and early for the next.

One thing about which we are still rather uncertain is the true size of a comet. We can measure the length of the highly diffused tail, getting answers which usually have to be expressed in millions of miles. We can measure the diameter of the coma, less tenuous than the tail but still highly rarefied, getting an answer that can be expressed in thousands of miles. But what is the diameter of the nucleus, the most massive portion of a comet?

From the fact that a planet can easily throw a comet out of its orbit and not suffer the slightest observable orbital change itself we can conclude that the mass of the comet must be less than one millionth of the mass of the planet. But that does not help us very much, that it is very small was evident from the outset. Recently N. T. Bobrovnikoff—*Pop. Astronomy*, March 1948—tried to approach this question with regard to comet Wolf I. Available direct observation did not help since it merely gave the result that the diameter could not be larger than seven hundred kilometers, or less than four hundred fifty miles.

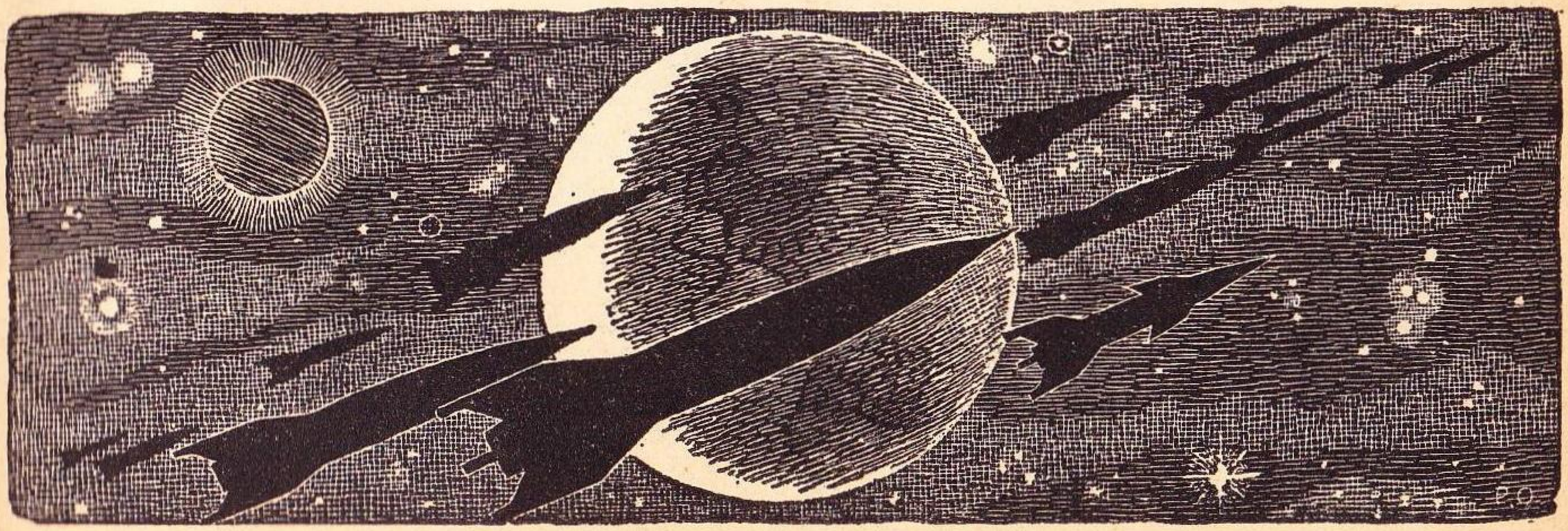
Making the preliminary assumption that the nucleus had a diameter of two hundred kilometers he found that its mass, in order not to disintegrate under the influence of the sun alone, would have to be 10^{-15} of that of the earth. If the density were the same as that of the earth, that would give a sphere of one hundred thirty meters —about four hundred feet—in diameter. Of course it was certainly less dense and therefore larger. But that the true diameter could not have been as large as two hundred kilometers was obvious for another reason; an asteroid of such size looks much brighter even over a far longer distance. Considering the observed brightness and the probable albedo Bobrovnikoff derived 8.8 kilometers—5.5 miles—as a likely value for the diameter.

This implies a still higher density than Whipple's model permits, for the density of a comet consisting of various ices would be quite close to "1." Consequently Whipple—*Astrophysical Journal*, May 1951—derived a larger diameter for the same comet. Here is an excerpt from the table of maximum diameters as calculated by Whipple:

COMET:	MAXIMUM DIAMETER *kilometers*	*miles*
Encke (<1865)	8.0	5.0
Encke (>1865)	18.4	9.9
Pons-Winnecke	164.0	102.5
Biela	3.4	2.1
d'Arrest	2.8	1.75
Brooks (>1922)	3.6	2.25
Wolf I (>1920)	38.0	23.7
1905 III	0.4	0.25

But—these are maximum diameters and Whipple himself added that in the case of comet Biela as well as that of comet Encke the true values were probably much smaller. Comet Biela, you remember, was the one that caused the panic in 1832 in Vienna. Knowing its probable size now and its constitution, one may wonder what the results would have been if there had actually been a direct collision at that time. If the area of final impact had been in Central Australia, or in northeast Siberia or in the Matto Grosso the brave burghers of Vienna would never have noticed it.

THE END



GRAMP AND HIS DOG

BY FRANK QUATTROCCHI

A friend doesn't have to be a human being—simply an understanding entity who has gone through many of the experiences that have shaped your own life. So with Gramp's dog . . .

Illustrated by Orban

The two young men struggled up the narrow, dimly lit stairs. They carried a large, bulky box which alternately forced one of them against the dingy wall, or the other into the creaking banister. They cursed and fought for balance, kicked the risers of the staircase, caught their feet in the shredded stair carpet, and sweated under the unaccustomed task. At the first landing they stopped and gingerly set the box down.

"Why can't we put him . . . find him a decent place . . . one with a lift?"

"Because this is a spaceman's rooming house and this is where he wants to be."

"My arms are broken. I won't be any good for tennis for a week," said the shorter of the two young men. "Come on, let's get this thing over."

The other sighed. "Regardless of what you think, remember, John, that this has to come off. So don't go in there with a 'let's get it over with' attitude."

The one named John made a vulgar sound with his lips. They lifted the box awkwardly and continued up the next flight of stairs.

"Why didn't you buy a *horse?* This thing weighs a ton."

"Quit grousing and hold up your end. It weighs sixty pounds and it's for him, not me."

They reached the third floor of the rooming house and walked sideways with their burden to a door at the end of a dark hall. There they set the box down and straightened themselves up a bit.

"Now remember, John, this is only a part of the whole plan. We don't want to mess up the rest of it with just a part."

"Pretty important one, old boy. Besides, Homer, you don't have to tell *me* about it, it was mostly my idea."

The young man named Homer began pounding on the door heavily.

"Deaf," he explained.

"I *know* that."

There came a low growl from behind the door. It grew from an almost inaudibly low-pitched tone to the threatening sound of a hateful animal. The two instinctively shifted their weight to feet farthermost from the door.

The growl of the animal grew louder and turned into a snarl. The sound of nails scraping on wood came from behind the thin door.

"That thing can *smell*," said John. "It can smell *this*." He pointed to the box at their feet.

"Don't be ridiculous."

"I tell you—"

"*Shhhhh.*"

"I tell you that Fido can—"

An old man's voice from behind the door interrupted him. "Who is it?"

"Homer and John," said Homer.

There was a long pause during which low-voiced conversation could be heard. It was followed by the sound of padded feet. Then the door opened.

"Hi, Gramp."

"Hello, grandfather."

"Boys. Come right in. Come right in. Good to see you."

Gramp was stooped and shrunken by age into a small man. Once he would have towered over the two younger men but that fact was not easily discernible now. He hobbled along ahead of them, his much-lined face aglow with an almost pathetically childish smile. A still thick shock of silky white hair topped his large, heavy-boned but sagging face. He was close-shaven. Myriad small scars drew the skin of the lower part of his gray-pink face over large cheek and chin bones. His old eyes were sunk in deep sockets. He was perhaps eighty.

Gramp directed the two to straight-backed chairs and sat down himself on a sagging old brass bed. He cast quick peering looks at the two grandsons and smiled, showing old teeth.

The two younger men were casting furtive glances about the cluttered old room. After a while he perceived this. For an instant the old eyes dimmed and narrowed very slightly.

"Fido's out. I sent him out. He didn't seem to reco'nize you—you don't come around very often any more."

"I . . . I was looking at your model of the *Einstein*," lied Homer. "I remember it since I was no higher than your knee, Grandpa."

The old man nodded without saying anything. He was surveying them somewhat appraisingly. Then he smiled again, a little less brightly.

"How you been, boys?" he asked.

"Fine, Gramp, and the family's fine too," said John. "They asked us to say hello. They said they were sorry they couldn't come this time."

"That's too bad. I judge they've been pretty busy."

"Yeah, Sis's fixing up for a party tonight with her fiancé."

The old man nodded.

"They asked if you have been receiving your trust checks all right," said Homer.

"Suppose so," replied the old man. "I got something in the mail a time back."

"Gramp," said John beaming suddenly, "you haven't asked us what's in the box here."

"It's for you, Grandpa," said Homer.

"Well, well," said the old man with enthusiasm. "Uh . . . will you open it up for me. My hands, you know."

They knew. His hands were plastic-surgery imitations constructed of bone and tendon from his feet. They had heard the story many times.

They set about opening the box. They broke a paper seal and picked out handfuls of shredded paper. Finally they lifted out a wooden packing frame and stepped back smiling at the old man.

"I . . . I—" began Gramp.

"*A new dog!* Almost exactly like

Fido," said John with exaggerated enthusiasm.

His brother gave him a dark look. "Here, Gramp, watch while I switch on his energizers."

He deftly touched concealed buttons on the stomach of the thing in the box and stepped back quickly out of the old man's line of sight.

For a moment nothing happened. Then, slowly, the thing moved. It raised a heavy canine head, wrinkling the loose black and white fur at the neck. The mouth opened, displaying a bright red tongue and white canine teeth. Large forepaws pushed the heavy, modeled shoulders up from the torn box. Hind parts lifted, then lowered to a sitting position. The tail wagged, thumping the bare floor spiritedly.

"Good, eh?" urged John.

The old man said nothing and did not move. His eyes seemed fastened to the animal. Then they shifted suddenly to the two men. He watched them with wide, old eyes. Homer touched another stud, galvanizing the head of the robot. The tongue came out a bit in an affectionate look and the eyes fixed themselves on the old man.

"Now watch," said John. Then, turning to his brother, he said: "Ready, Homer?"

He carefully approached the dog on hands and knees and reached once more under the animal's chest. Pressing a stud he quickly stepped back and rose to his feet in front of the thing.

Instantly the dog braced itself and bared teeth. It snarled. The hair rose on its broad, heavy back. It growled. It poised—

"See, Gramp, see?" John said nervously. "Watchdog. Thinks I'm a robber and he's going to get me. *Homer!*"

The other man was an instant too late. The dog sprang, its teeth catching in the man's coat sleeve. There was a small sound of tearing cloth and then a muffled curse.

"Get him! Get him!"

Homer found the stud. Instantly the dog sagged to the floor.

"You see?" asked John. "Perfect control. That was a built-in pattern. You got to train him gradually for voice control. It takes your own voice, Gramp. But a lot of patterns—like the Watchdog one—are already built in."

"He's for you, Grandpa," said Homer quickly. He bent down to stroke the stiff fur. "We thought you could use a new one. We had him made just exactly . . . that is—It won't take you any time at all to train him—"

"But . . . but—" the old man started to protest.

"He's all yours, Gramp," interjected John. "Why he cost—"

"No!" said the old man suddenly, his eyes wide.

"Fido is getting old, Grandpa,"

said Homer. "It's time you got a new dog . . . and maybe thought about moving away from here, too."

"No!"

"We got a nice place all picked out," said John. "You and your new dog can move in . . . there are lots of other people—"

"NO!" It was very nearly a shout.

"I'm afraid Fido is a bit old," put in Homer ignoring him. "His disposition is a shade too—"

"Gramp, listen to me," said John. "This old place is too small and beat up for you and that dog. There've been some complaints . . . not many, you understand. But some. You remember in the park—We're getting that straightened out, but it's going to cost—"

The old man's face was transfigured. "Take it away! *Take it away!*" he whimpered. "You . . . *go!* Fido . . . he'll be back. He don't like you—"

They went. They carried the robot back down the long stairs by its stiff legs.

George Stranton surveyed the young face before him and tried not to see a family resemblance in its weak components. He thus hoped to avoid comparisons between the young cousin and his uncle Raymond, the youth's dead father. He was successful while the cousin spoke—for he whined slightly and the father had never whined. But now, as John Stranton waited for him to reply, the resemblance was there.

"I think I could have told you it wouldn't work," he said. "He doesn't want to leave the rooming house."

"It isn't that, George. The family doesn't want . . . the family has a nice quiet place all picked out for him. Nice and quiet, where he can be with others—"

"And after his life he's supposed to want a 'nice quiet place where he can be with others'?" Stranton asked.

"Well, George, it's better that way."

Stranton pointedly glanced at his watch. He wished he could honestly say he was busy.

"Better? Better for *him?*"

"Don't be sentimental. You know the score. Incidentally the meeting with the kid's parents is set for the eighteenth. The kid is all healed up but they're still going to put the screws to us."

Stranton had temporarily put the subject out of his mind. It came back with pain. "My lawyer tells me we might prove provocation."

"*Provocation!*" snapped the young man. "That's not the point. The point is we can't afford to let the thing go to trial. They'd bring Gramp out and make him testify—and you know what the papers would do with the thing."

There was a point to what his cousin was saying, Stranton admitted to himself. He could not force himself to imagine the old man on the stand

defending his beloved robot—and perhaps himself also, as the robot's owner. They would almost certainly demand the robot be destroyed. They might even demand that the old man be examined—

"But what did you expect to gain with that thing?" he asked, pointing to the mechanical dog, which lay in the corner of his office.

"When I shell out eighteen hundred units for something I expect *plenty!*"

"Gramp has had that robot for longer than either of us has been alive," Stranton put in.

"And we got to get it away from him!" shot the cousin. "It's wild . . . *mad!*"

"Robots don't go mad—"

"This one is," affirmed John Stranton. "You ought to see it, George. Gramp has tinkered with it and it even *looks* mad. I'd expect to get hydrophobia if it bit me!"

Stranton studied the younger man for a minute. "Tell me, kid, what is this fuss by the family all about? We can clear up this business with the little boy in the park. Gramp will probably keep the dog chained up or something from now on. But why all the fuss?"

"Family pride."

"Nuts! What's *your* angle, for instance?"

"O.K., O.K. You know they . . . I finally got in with *Williams, Harris, and Clark*. It took a lot of digging—I'll be honest with you. Anyway, I'm in now. I'll work my way up in the company starting with law clerk. Then some day . . . Clark isn't very healthy, you know —"

Stranton had a sudden urge to throw the pale-faced law clerk out of his office. But he checked it.

Williams, Harris, and Clark, Galactic Estates Attorneys. He wondered how many exclusive clubs, how many carefully contrived cocktail parties, how many times—

The young law clerk interrupted his thoughts. "Let's get down to it, George. The family now has status. No—you may not give a damn for that, and I don't either. Not for status *per se*—although Mom and Sis and the rest probably get something out of it.

"But to me it means cash, plain hard cash. Good connections. Juicy retainers—"

Stranton scowled audibly. He was about to say something when the other leaned forward confidentially.

"How many times has it meant something to you, *Cousin George Stranton?* How many times has it meant a fat engineering contract? Besides the fact that you're a genius, of course."

The older man gazed at the son of his favorite uncle. Hating him as he assuredly did, Stranton could not help granting his cousin the success of that thrust. It had hit home. And hard.

When was it that he had last taken

the trouble to visit the old adventurer? Not for years. Not since his Grand Tour after graduating from college. He remembered the visit with a mixture of pleasure and guilt. He remembered telling the old man about Mars, about Dome City and the expeditions then being undertaken into the equatorial belt. He had described his own dilettante's trip to Outpost—only to have the old man recall his own first visit to Mars.

That had been eight or nine years ago. Deep down did *he* also feel ashamed of the old spaceman?

"Go and see the old codger, George," said his cousin finally. "He likes you. You're one of the few of us he really trusts. Take a look at Fido while you're there. Take a look at the way Gramp lives. It isn't just this Fido thing . . . it's well, just think of what some sharp reporter could do with a story about the oldest living member of the Stranton Family."

The old man rose from the creaking brass bed. He rose heavily and awkwardly and was not quite able to straighten his back. He shuffled across the floor dragging old high-top shoes on the worn, splintery floor. Slowly and carefully he stooped with one hand at his back. His old bones creaked. He felt pain.

With difficulty he was able to break the corners of the cardboard box and flatten it on the floor. He folded the cardboard this way and that until it formed a fairly compact mass. Then he straightened up again, once more suffering the pains of age, and hobbled to the back door to the room. Opening it, he peered out into the gathering dusk. Once the old man's room had been a part of a hall. It opened directly onto a fire escape.

"Come on, old boy. It's all right now."

The animal followed him back into the room and stood motionless near him, its tail weaving back and forth stiffly and not realistically.

"It's all right now, boy. It's *all* right. Here, take this paper down to the alley."

The dog accepted the folded cardboard, its teeth closing upon it. The old man followed the animal back to the door.

"Oh . . . wait, Fido," he said suddenly just as the thing disappeared out onto the fire escape again. He was peering down the long stairs at a small section of yard far below. Several children were playing a game among some heaps of building materials.

"Never mind, Fido," he said in a low voice. "I'll have Mrs. Jameson take it down tomorrow morning."

The dog re-entered the room and the old man closed the door.

"Do you like my hair, Mother?" asked the pretty girl casually. She was forcing the heavy stalk of a tropical bloom down into the teeth of

a florist's frog.

"Very much, dear," said the older woman without looking up from her book.

"Do you like the color?"

"Very attractive."

"Do you think Henry will like it?"

"Very much."

"Mother!" snapped the girl, abandoning the flower arrangement. "You aren't paying a bit of attention."

The mother looked up from the book with a guiltless expression. "Henry will be enthralled, I'm sure, dear. He is positively moon-eyed over you. It was very evident the other night."

"But this is different. This is formal . . . he wants to meet you, the family—"

"Fine."

The girl bit her lower lip and frowned. "Mother, have you talked with Homer since he and John returned?"

"Returned?"

"From grandfather's," said the girl impatiently.

"No, no I haven't, dear."

"Well, they failed. He didn't even take the *dog*."

"Failed? Dog?"

"Mother! This is serious. It's very serious. You *know* about grandfather . . . the *room* he lives in . . . that horrible dog—You know that Henry is running for the Senate—his reputation—"

"Perhaps Henry won't ask about your grandfather, Gloria—"

Stranton put down his pencil, wadded up a sheaf of scratch papers, and began telling himself that it was time to go home. The others had long since checked out, leaving him to toy with The Gimmick.

The Gimmick was the pet name given to a special engineering problem which one or another of his staff—and a great many other staffs—had pondered hopelessly for years. The problem was to design a practical, self-maintaining circuit monitoring and repairing device which, when installed in a computer bank, would solve the incredibly complex maintenance problems of such instruments.

Well, thought Stranton rising from his drawing desk, there's no hurry. Human labor is going to be cheap enough for a good many years yet to make the enormously expensive Gimmick a purely academic study. He was about to pick up his hat and coat when he saw the robot.

A lot eighteen hundred units meant to John Stranton, he thought. His cousin had simply left the thing there. Well, the punk had spent a great deal more than eighteen hundred units on similarly foolish gadgets, all of them designed somehow to advance his position or, as in this case, to ward off a threat to it.

Stranton bent down and examined the robot dog. John had evidently cut the switch on the intricate ma-

chine while it was in the midst of some sort of action. Its head was raised and its feet were still extended for standing.

Beautiful job. He touched the synthetic fur of the nose. It was properly stiff. The eyes were especially realistic. Although they were actually tiny image receptors for the computer-brain they were nevertheless ornamental.

The ears were likewise excellently constructed. Somewhere under the large hairy ear flaps there were a pair of tiny microphones which probably were tuned to a real dog's sonic sensitivity—or even beyond.

The company's label was still in place on a chain around the robot's neck. Mark IV—Stranton remembered reading an advertisement regarding this model. It carried the most extensive—and expensive—computing device for its size in existence. He found himself wondering if the computer was actually contained in the robot's head. Probably it was not. Not all of it anyway.

In spite of himself Stranton felt the urge to experiment with the mechanical beast. He actually knew very little about the mechanics of robots. He did not encourage robot makers to send him their computer problems because he did not understand the finer points of their intricate servo-effectors. Robot computers were simple enough—although remarkably complex for such small units—but far less complex than even the simplest flight control computers and hence boring to him.

He allowed his hand to run experimentally over the concealed panel of studs under the fur of the robot's belly. He pressed one of the studs.

Instantly the animal came alive. It rolled over quickly and retracted its legs. Almost at once it was on its feet. The head swung from side to side only briefly before coming to rest with the eyes glaring at him.

Stranton felt the hair rise on the back of his neck. The dog rocked backward into a crouch, its hind legs cocked. It began a low growl, producing it deep in the mechanical throat.

His cousin had said something about a Watchdog pattern—They had simply cut the power switch—he had turned it on again!

He backed off a pace. He struggled to force his mind to produce something from his experience to ward off the slowly advancing dog. How did an owner control such a thing? By voice command.

"Fido!" he shouted. "Down! Down!"

No, the animal did not yet respond to voice. He retreated from the advancing dog, keeping himself just beyond pouncing range. He watched nearly fascinated as the robot placed forepaw after forepaw upon the floor. How would he get to the thing's belly to switch off the syndrome?

He grabbed a chair and slid it on

the polished floor until it rammed into the animal. But it easily evaded the obstacle and continued its relentless advance. It was maneuvering him into a corner! The only door to the private office lay behind the snarling metal dog.

Stranton felt his way to the drawing desk, fumbled behind his back quickly. He found what he was seeking, quickly snatched it up and threw it with all his strength.

The heavy lead paperweight caught the robot at the last instant before the spring. It thudded against the flat top of its head and glanced off apparently without effect.

But the robot froze. While Stranton watched completely motionless, a pale liquid welled in the half-open mouth.

Electrolyte.

"Remember," said the man warmly, his eyes glowing under the single, unshaded light, "when we went in on Four Beta Aurigae?"

It was not really a question and it received no reply.

"It wasn't one of them 'Little Terras' they're always looking for nowadays. It was rough, wild, and it fought back—hard. You remember that, don't you?"

There was the suspicion of a nod.

"And we were the first. We just orbited in and kept our eyes open for her defenses. I guess the planet did the same.

"You remember, Beta Aurigae was big and white. Big as the orbit of Mercury and a whole lot hotter and whiter than Sol. At first we thought it would be too hot for anything to exist anywhere near it. We chose the fourth planet on a hunch.

"You remember, I said beforehand there might be something there. Because of that thick-soup atmosphere. I had spent some time foolin' around Venus and I just figured there might be something there."

There was a long pause before he continued. It was utterly silent in the room.

"We lost four good men just trying to set up camp, you recall. Purdy, Jackson, Stein, and—I forget the other man's name. Four men. And it wasn't anything very unusual that got them. You know, people always want to think it's bug-eyed monsters. But it ain't usually.

"Mostly it's some silly thing. Like that cycad tree that just fell on Purdy. Or the leaky valve in Stein's suit—I think it was Stein. Maybe it was Jackson.

"Higgins—that was the other man's name. Ez Higgins. He got his with the ants—I still call them ants. I suppose if you wanted a story of alien monsters Higgins' story would come as close as most. Remember, he accidentally stepped on a hive of 'em. Little teeny weeny things. With clampers like tool steel. They bit right through his plastic suit.

"Well, it's good to talk to you

about them days. You never get tired of my old stories, do you? Or of *me* either, maybe. I guess you've listened to these stories a thousand times. And you were there on some of them, weren't you? But you just sit around here and listen to an old fool and somehow you understand. Maybe you understand—I kind of think you do."

The dog thumped its tail on the wooden floor a bit feebly.

Stranton pressed the switch on the frozen dog, caught the suddenly limp metal animal, and eased it to the floor. He pulled out his handkerchief and mopped up the electrolytic fluid. It would make a stain on the floor, he knew.

Why, he asked himself when the task was complete, would anyone go crazy over such a device? He could easily appreciate a man loving a real dog, for the real animal would respond to affection and even return it, to a certain extent at least.

But could a robot?

Hardly. A robot could assuredly *interest* his master. His myriad reflex circuits and subcircuits would provide an almost endless number of possible tricks and gestures, perhaps even interesting new combinations of them. It might provide a man with a constructive hobby to investigate the subtlety of such a robot's possible responses. But could the mechanical animal really satisfy the real dog's role? Could it be a dog?

Stranton thought not.

The robot predictably would become more nearly *human* after each trick. But no man could make it become more nearly *dog* no matter how many tricks he taught it. Subconsciously he would project his own —not a dog's—personality upon the computer brain. At very best the robot would become an imitation of a human's *idea* of a dog. But not a real dog.

Stranton gave it up.

The drunk placed heavy, noisy footsteps upon the dark concrete. He flopped down each foot with exaggerated deliberation and carefully measured his pace so that each fell within the boundaries of the cracks in the sidewalk.

He began to whistle, but his lips were flabby. The higher notes emerged as mere exhalations of breath. He tired of whistling and started to sing the same tune. He did not know the words. He began in too high a key and could not reach all of the notes. He lowered his voice drastically and was pleased by the guttural quality of his notes in the lowest register. He switched the tune to a classical baritone selection and sang loudly to the darkened buildings.

In his preoccupation he nearly stepped on a crack in the sidewalk. Becoming aware of it just in time, he leaped, landing heavily on the side-

walk. He nearly went down. In the resulting struggle for balance he actually did step on a crack. He nearly wept.

But then he saw something that attracted him.

"Here doggie, doggie," he crooned. "Nice doggie, doggie—"

He advanced toward the darkened doorway, assuming the attitude of a walking crouch. He tried to snap his fingers, but failed.

"Nice doggie. Nice doggie, woggie. Come 'er nice puppy dog. Come 'er nice puppy dog."

The animal backed up a pace into the doorway.

"Don't go 'way, doggie," he sang. "*I* won't hurt you. I won't hurt you a bit. I jus' wanta pet you, nice doggie—"

The dog backed another pace, bumping into a step. Its nails slipped on the concrete.

"Come 'er nice doggie. Let's be friends, huh? Let's be friends?"

The drunk extended his hand above the dog's nose.

"Goin' take you home with me, puppy dog. Jus' look at your fur, all ragged. Nobody to take care of you, huh? Jus' like me. I'm goin' take you away from here—"

There was a short struggle, a flash of teeth, a yelp and a choked cry, then silence.

"Sit down, Mr. Stranton," invited the big man.

"Thanks."

"Suppose you have no idea of why I sent for you?"

"Nope. Can't think of any way I've brushed with you people—but then there are a lot of laws these days."

Stranton had expected the man to laugh, but the big detective only half smiled.

"You're not in any big hurry, are you?" he asked.

"No."

"Good. You have a very fine reputation in computer engineering," said the man casually.

"My very able staff explains both that and why I'm not in any hurry," Stranton said, again trying to break the man's hard exterior and extreme seriousness.

"Well, I called you in to talk about a problem of ours. You may be able to help us out on it. If you're willing—"

"Of course."

The man eyed him for a time. "Tell me, Mr. Stranton, *can a robot think?*"

Stranton smiled. "Next question."

"Pretty poor at that, wasn't it?" said the detective. "What I mean to say is, after you discount all of the things that a robot has learned, all that it received directly or indirectly from human beings—then, is there anything left over?"

"I . . . that's a question you would have to break down a lot before I could even attempt an answer," said Stranton.

"Let's break it down."

"And even then," Stranton continued, "I might be unable to answer it—or it might be unanswerable."

But the detective would not be dissuaded. "Can a robot initiate an original act?"

Again Stranton shook his head. "Captain, it depends. It depends first of all upon what you mean by 'initiate' and 'original act.'"

"Can a robot use *discretion?*"

"It depends upon the kind of instructions—and I'm not evading your questions," Stranton pleaded. "These things are matters of definition first of all. You can instruct a robot to search data cells until it finds what you are looking for. The robot—and I think you mean computer, rather than merely robot—will choose its own search pattern, based pretty much upon a statistical system. If that is discretion, then the answer to your question is yes.

"That would be the simplest kind of thing you *might* call discretion. Beyond that are, however, almost infinite extensions. Some of the extension of just that simple act very closely borders on what we commonly speak of as 'thinking.' There is a very fundamental principle involved here, captain. One that philosophers debate more or less continuously."

"Can a robot kill a man?" shot the detective.

"Why . . . of course."

"Purposely?"

Stranton felt beads of perspiration rise on his forehead. He was aware of the hairs on the back of his neck.

The detective quickly handed him a photograph. Instinctively Stranton was repelled. He forced himself to accept it.

It was not pretty. The mangled body of a man lay in a pool of blood. What could be seen of the face was evenly striped with deep scratches. The throat, which should have been visible, merged with the dark pool.

"We found this stuck in the body," said the big man.

It was an animal claw, except that where it normally would have fit into a nail socket there were gear teeth and a hole.

"It happened on the east side of town, early this morning. There are only a half dozen or so mechanical animals registered to owners in that district—"

Stranton turned the metal claw over and over in his hand. Dried blood still clung to a crevice.

"I believe, Mr. Stranton," said the detective looking at a paper on his desk, "that you are somewhat familiar with the district. Perhaps an engineer of your *reputation* could do some research for us—"

George Stranton finished off the last of the now cold black coffee and tried once more to make the double page of intricate circuits make sense. Ordinarily he would have found them easy to grasp, for despite differences that related to size and shape they were based upon many of his own designs.

But his mind wandered and lagged. He lit a cigarette and disgustedly tried to find a place for it amid the others in the ashtray. He exhaled smoke and forced his tired eyes to strain through it to the welter of lines before him.

Oddly enough, his wandering mind seemed always to turn back to The Gimmick, the circuit-monitoring problem. But this was no time to play academic games, he told himself. The Gimmick must wait.

Often when faced with a problem such as this one he would encourage his mind to wander. His best, most creative ideas often came during such periods of near inattention. But now it would not seem to work.

Well, what actually was the problem? Fido—period. Fido, the *wild* robot. His mind rejected the idea of a wild robot. The thing that now lay in his corner could not, he told himself, become wild. When it had stalked him it had been merely acting out a perfectly rational and entirely contrived syndrome. Some clever technician had literally wired in the pattern. Much more difficult problems daily confronted even the robot makers.

And yet he could not escape the apparent fact that Fido was wild. He

recalled the police photograph. Yes, the cur was wild, unless—

Unless you assumed that Gramp himself had initiated the dog's midnight will—No, he could not force himself to accept that. He remembered the old man from his earliest childhood, remembered practically the first time his father had taken him to the shabby room. He remembered the spaceman's souvenirs. He could still feel the thrill of the time he had first been allowed to touch the model spaceship, the *Einstein*.

No. The ancient spaceman could not harm a fly. Nor could he allow his dog to harm one. Nor did the detective seem to think so either. Otherwise why send the old man's grandson to do a "research problem"?

Back came thoughts of The Gimmick.

What actually did he know of Fido? Well, the mechanical hound had been around since before Gramp had the accident with his hands and settled down in the lonely room. It had not always been vicious. Stranton remembered that it had been entirely friendly, though aloof, when he visited there as a child. It had shown no sign of aggression—toward *him*, anyway—during his visits to Gramp as an adult.

Yes, he remembered the park. He had heard endless descriptions of the incident there. Gramp and Fido had visited the park almost daily. Children had often walked up to Fido, to "see the nice doggie." None had ever been harmed. Not until that particular day. It seemed that the child had become abnormally attached to Fido, had ended by trying to take the dog home with him. In the little melee that followed the child had been bitten.

Before that? Well Fido had once taken a slight nip out of the daughter of one of his cousins. It had not been at all serious. Again the child had become somewhat possessive of the cur—

Wait now, thought Stranton. Was there a pattern in this? Both the children had been attacked because they wanted to drag him home with them —*away from Gramp*.

The man in the photograph? The detective had said the man was drunk. Had he thought Fido a simple stray and, in drunk's fashion, decided to take him home? Well possibly, just possibly.

But what did it mean? Statistically such an idea was poor, perhaps even worthless.

For one thing, it depended upon a thing he had already ruled out: that Gramp had deliberately set into the robot a vicious pattern response to a possible thief. No, the old man would not have done that. He might well have trained the dog to avoid strangers—especially after one or another of the incidents—but he simply would not have implanted in the robot brain anything harmful. To run, to growl, perhaps, but not bite and certainly

not kill. Knock down—but no more.

Again thoughts of The Gimmick intruded themselves into his mind.

"Gramp, I don't think I'll ever get tired of hearing you tell about the *Einstein*," said Stranton truthfully. "You know, don't you, that you've told me that same story a dozen times?"

"Have I, George?" said the old man lowering his head. "I guess I forget. There's a lot of you kids now."

"And you've told it to them all."

"Suppose I have at that," Gramp sighed. "Well, George, when you get as old as I am you get that way. You're a youngster—"

"Thirty-five."

"When you get my age about all you got left is your memories. Why, do you know, I even tell Fido there stories."

Stranton glanced at the quiescent robot. It was stretched out in an almost perfect imitation of a sleeping dog. Its eyes were closed.

"His favorite—the one I tell him the most—is the time he saved my life and lost his oxygen rig doing it."

Oxygen rig?

"That was the time I lost those," continued Gramp, displaying his hands. "Fido saved my life by pulling me back into the ship. He couldn't get a grip on me with the oxygen rig on, so he—"

Stranton's mind spun. *Oxygen rig!*

"Don't think you've ever told this story quite like this before," he said very evenly, his mind working desperately.

"No? Why I think I—" began the old man thoughtfully.

"Gramp, what did you mean by saying he lost his oxygen rig? Do you really mean *oxygen* rig, or some other kind of rig?"

"Oxygen rig—" he repeated. Then he stopped, his old face becoming suddenly ghost white.

"Then Fido . . . was once . . . a *real dog*," said Stranton in a dazed voice. "*There was a real Fido once!*"

Gramp was stricken. He covered his mouth with his hand. He glanced about wildly. Finally he shot a quick, almost frightened look at the sleeping robot dog.

"George . . . I never until this day admitted . . . admitted even to myself . . . that there ever was . . . another Fido—"

A living Fido! thought Stranton. Didn't that explain how the old man had trained the robot to be such a diabolically clever image of a dog?

"He . . . he's a good dog, George. He *is* Fido! You . . . you will keep them from taking him away from me, won't you? Won't you, George?"

They can never take Fido away from you, Gramp, thought Stranton. Fido is a *memory*. A system of large and small things, a whole world of memories, a million tiny little acts remembered—remembered and finally trained into the very fiber of a—*ma-*

chine!

There was the explanation for the fierce possessiveness the man had for the robot. And somehow there, too, was the explanation for the twisted but equally fierce possessiveness of the robot.

And there was something else—

"Gramp," Stranton said interrupting the old man's pleading, "what repair shop do you take Fido to?"

"Repair shop?" asked the old man incredulously. "Why none. But he don't need much, George. I . . . I . . . I have my own set of tools—you know, the ones I used to make the *Einstein* there. I couldn't let anybody . . . they might—"

Might somehow damage the one thing that still remained in the old man's life, thought Stranton. Might erase a part of Fido—

"You were a master mechanic in your day, weren't you, Gramp? That gave you the knowledge to keep Fido more or less repaired."

"My eyes are getting pretty dim," said the old man. "I don't do so much for him any more—but nobody else is going to monkey around with *my dog!*"

"But, Gramp, what about his *computer*, his brain?"

"I . . . I . . . I trained him from a pup—he was grown up but he was a pup inside. I taught him everything Fido ever knew, ever did. I broke bad habits—sometimes he would do . . . things—but I *talked* to him, George. I can talk to him some more, George."

"Gramp," Stranton said softly. "Gramp. You know he—hurt a man. It was pretty bad—"

"Yes . . . I had to clean him off. But I can *talk* to him, George."

But you can't tell him how to repair a worn out computer. You can tie up a shorted circuit with a new one. You can tie up three more when *that* begins to bleed electricity. You can tell Fido *not* to do what eighteen more shorted-out, blocked-off, worn circuits are telling him *to* do. And he'll stop—for a while, a few years, maybe a lot of years. But some day—

"George . . . George . . . have them take *me* away. Fido is all I have in this world—!"

So that was why The Gimmick kept coming back to him! Give Fido a Gimmick system, a system to keep track of all the weak circuits and to repair them—and Fido never goes "wild." He *repairs* burned out circuits instead of trying to counteract them! It would be impossible to design a Gimmick for Fido, of course, *but the function had to be performed and Gramp had not been able to perform it!*

"Gramp," Stranton said very softly, "I want you and Fido to come and live with me. What you both need is somebody to be around to see that you don't do silly things to yourselves—out of sheer loneliness!"

THE END

STARDUST

BY CHAD OLIVER

In space, *people can get lost for a looooong time! Then, mere physical rescue is not enough; there's little point rescuing a man's body, if you kill his mind doing it!*

Collins floated through the jet blackness with every sense alert. He heard the low hum of voices welling up out of the emptiness ahead of him and the oxygen in the still air tasted sweet to him as he drank it into his lungs. The cold smell of metal was all around him, hemming him in, and he shivered involuntarily in the darkness.

At precisely the right instant, he extended his hand forward, made contact with an invisible brace that felt rough and dead to his tingling fingers, and changed direction with a light, delicate shove. The new tunnel was almost as dark as the one he had left behind him, but he could see a faint luminous haze in the distance. His

pulses quickened as tiny warmth currents touched his skin and he caught the smell of men in the abyss ahead of him.

It was good to be going toward men, Collins thought. It was a good feeling. He kept to the exact center of the shaft, as far away from the cold metal taste as he could get. A man knew loneliness in the eternal night, alone with his thoughts. A man knew fear—

He guided his body around another turn, and still another, and felt the sudden life shocks in front of him. He closed his eyes to narrow slits, letting them adjust. He could feel space and air on all sides, and the cold, unpleasant smell of metal receded into the distance. Warmth currents bathed his skin—and yet there was a coolness even here, an icy coolness of hostility that mottled the warmth tides like a cancerous disease—

Collins shook the feeling from his mind. Slowly, gradually, the chamber took shape around him, although he still could not look directly at the intolerable, flickering flame that hissed and sputtered atop the fire torch. Black shadows writhed in the gray halflight on the periphery of the fire-glow and white bodies floated all around him, waiting.

Collins took a deep breath. He could see again.

"Class will come to order," he said into the silence.

The men—young men, all of them—hesitated and then moved into a circle around him. The circle was composed of three distinct layers, one even with Collins, one slightly above him, and another just below him. Each layer contained four men. Collins forced himself to look directly at the fire torch, even though the unaccustomed brightness lanced little needles of pain through his eyes and narrowed their pupils to tiny dots of black. It was not easy, but he kept his face expressionless.

Men were made to live in light.

"Before we start, do any of you have any questions about your work for today?" His voice was soft, patient. But it had a firm edge to it—sheathed now, but capable of cutting like a knife when the need arose.

The young men looked at each other, faintly hostile, uncertain.

"Speak up," Collins said, smiling. "Asking questions is not a sign of ignorance, you know. It is only the stupid who never ask questions."

One of the men cleared his throat. It was Lanson, one of the most intelligent of them. Collins nodded encouragement.

"We don't understand our problem for today, sir," he said, faintly accenting the *sir* to give it a slightly contemptuous ring. "We've talked it over among ourselves, but we can't seem to get it."

"Be specific, Lanson. Exactly what is it that you do not understand?"

Lanson shifted nervously in the still air. "It's about this problem of falling

bodies, sir," he said. His voice was genuinely puzzled now; Lanson was interested almost in spite of himself. "You stated that, because of gravity, two bodies will fall through a vacuum at precisely the same rate of speed, regardless of weight—that is, if we get your meaning correctly, a *heavy* body will fall with the same speed as a *light* body, or, to use your example, a piece of paper and a chunk of metal will hit the floor together."

"O.K. so far, Lanson," Collins braced himself, knowing what was coming. It *was* difficult.

"Well, sir," Lanson continued, choosing his words with care, "we sort of see what you're driving at in the concepts *heavy* and *light*—but what is *falling?* What pushes the piece of paper and the chunk of metal down? Why don't they float like we do?"

"They *do* float," a voice whispered loudly. "Everyone knows that."

Collins looked at the white bodies around him, pale and ghostly in the dancing fireglow. Beyond them, the great darkness hovered like a gigantic beast, shadow tentacles writhing, waiting to envelop them, pull them all into the black vault of the abyss. Collins shivered again as an icy chill crawled down his spine. They couldn't go on like this forever, he knew. They weren't trying the way they used to—it was very hard, and they weren't *trying*. Every day, every hour, they lost ground. And below them, dancing around their great fires—

He *had* to make them see.

"You are right, in a sense," he told them carefully. "I'm glad to see that you're using your minds and not just accepting what I say without thought of your own. They *do* float, as you've seen—here. The point is that conditions here are unnatural, not normal, although they are the only ones we've ever known. I've tried to tell you about gravity—"

"Him and his gravity," someone snickered.

"We're not approaching the situation with the proper gravity," someone else whispered. Several of the young men laughed aloud at the pun, staring at Collins with ill-concealed contempt.

"Yes, but what *is* gravity?" Lanson persisted. "You say that in science we experiment, we measure, we deal with facts rather than wishful thinking. Very well—*show* us some gravity then."

Collins breathed deeply, feeling the doubt all around him. "I can show you no gravity that you can recognize as such," he said slowly. "Nor can I show you the atoms of which matter is composed, much less the subatomic constituents of the atoms themselves. You must be patient, you must consider the situation in which we find ourselves. Even in science, gentlemen, there are times when we must go along on faith, do the best we can—"

"We're not trying to dispute your

word, sir," said Lanson, who was doing precisely that. "But it seems to us that even if all this stuff were true somewhere, sometime, we still have to live *here* and not *there*. Since we have to live here, why not confine ourselves to this world, to what can be of practical use to us, and just forget about—"

"No!" Collins said sharply, the anger rising in him like a hot flood. "That will do, Lanson, unless you wish to be reported. We *must* not forget, or we are lost, we are animals, we are no longer men. One day you will see and understand. Until then—"

He stopped, suddenly. The men shifted uncertainly in the air. Collins tensed, every sense alive, vibrant, questing. He probed the deep shadows. His skin tingled. Something was out there—those shadows were no longer empty. Something—

"The other men," he hissed. "Kill that torch."

The flame sputtered and died. The men drifted backward, united now against a common danger, fighting to adjust their eyes again to the absence of light. Collins felt his heart hammering in his throat and cold sweat in the palms of his hands. He drew his knife, waiting.

In the dead silence, panic stalked on padded feet through the chamber of darkness.

Ship's Officer Mark Langston tossed off a few choice expletives and permitted them to explode harmlessly within the confines of his book-lined office. He flipped open a desk drawer, removed a well-worn flask, and treated himself to a short snifter of Scotch. Then he replaced the flask, banished the contemptuous expression from his face, and glued a patient smile to his mouth.

"Come in," he said, bracing himself.

The office door opened with a calm precision that hinted at a hurricane just below the horizon. A tall, angular, hatchet-faced woman marched inexorably into the room with her teen-age daughter following meekly in her wake.

"You are the Ship's Officer?" inquired the woman in a voice like a file sawing on iron.

"Right the first time," said Mark Langston.

"You're not the same man I spoke to last time," the woman stated suspiciously. "Where is Mr. Raleigh?"

"He jumped overboard," Mark Langston wanted to say.

"Mr. Raleigh is not on duty at the moment," Mark Langston said. "My name is Langston—may I be of service?"

"Well, I should certainly hope so. *I* am Mrs. Simmons, and this is my daughter Laura."

Mark Langston nodded and glanced at the note that Raleigh had left on his desk. *As a small token of my esteem, I have willed you Mrs. Simmons*, the note read. *May God have mercy on your soul.*

"What seems to be the trouble,

Mrs. Simmons?"

Mrs. Simmons sighed deeply, giving an excellent imitation of a death rattle. "It's this *excruciating* artificial gravity, Mr. Langston," she said. "I simply cannot stand it another moment. I'm having terrible pains around my heart and my back aches. I'm a nervous wreck. You've got to *do* something, my man. And my darling Laura absolutely can't sleep at night —she does need her sleep so, she's such a delicate child. Aren't you, Laura?"

"Yes, mother," said Laura in a delicate voice.

"Well now, Mrs. Simmons," Langston said carefully, struggling desperately to maintain the smile on his face, "I find this most difficult to understand. Do you have these symptoms back on Earth? You see, ship's gravity is kept at all times at Earth normal—there's no difference whatever, in effect, between artificial gravity and the gravity you have lived with all your life."

"My good man," Mrs. Simmons said, drawing herself up haughtily, "are you accusing me of—"

"Not at all, not at all," Langston lied. He forced himself to remember Mr. Simmons and his power and influence with the Interstellar Board of Trade. "It's quite possible that the machinery is out of adjustment or something. I'll check into it at once, Mrs. Simmons. We will spare no effort in securing your comfort during your stay on our ship. In the meantime, won't you check with Dr. Ford on Three Deck? I'm certain that he'll be able to help you and your daughter."

Mrs. Simmons brightened visibly. "Oh Mr. Langston!" she breathed. "Do you *really* think I require medical attention?"

"It's entirely possible, Mrs. Simmons," Mark Langston said, and meant it. He neglected to mention what sort of medical attention he thought Mrs. Simmons needed, but that was a minor detail. "I'll buzz Dr. Ford and he'll be ready to take care of you instantly."

"Thank you *so* much," Mrs. Simmons said happily. "Come, Laura—now watch your step, dear."

Mrs. Simmons and her offspring left the room and the door hissed shut behind them. Mark Langston maliciously neglected to warn Ford in advance; it was a dirty trick to play on the Doc, of course, but Ford was capable of handling the situation and would duly dispatch Mrs. Simmons and Laura to some other luckless official.

Langston got up from his desk and limped over to the private screen against the outside wall. He flicked it on and an infinity of night reached coldly into his soul and pulled him out among a myriad of incredible stars—

There it was, right in his office with him. Space, deep space, the endless darkness and the stars that had been

his life, his very being. He lost himself in the ever-new immensities. This was space—the space that he had helped to conquer, the star trails that he had made his own. This was the strange world that he had chosen for a home. Out there, far beyond imagining, distant beyond belief, the men and the women that he had lived with, fought with, laughed with, flashed forever into the deeps of night. They carried the great adventure onward, always, and now—

And now he was no longer with them.

Mark Langston turned off the screen and limped back to his desk. They had opened up the greatest frontier of them all—and for what? For Mrs. Simmons and Laura? For stupidity and greed and ignorance? For wealthy tourists who made the Earth a world to be ridiculed? For what?

Yes, he was still in space. He smiled without humor. He would have been wiser to have stayed on Earth, or on one of a hundred worlds that he had known. Wiser to have cut it cleanly and for good. Wiser to have left space behind him. Once, on the long runs, the new runs, he had been proud and happy to be a man; he had gloried in it. Now—

But he could not leave space. It was a part of him.

A red light flashed over his visibox. He switched it on. It was Stan Owens, the ship anthropologist. He looked excited, which was profoundly unusual.

"What's up, Stan? More of those pesky space pirates?"

"Cut the clowning, Father Time. We've run smack dab into the middle of something."

"On the Capella run? What is it—the Ultimate Boredom at last?"

"On the level, Mark. We need you in the control room on the double."

Mark Langston eyed his friend's face with sudden interest. "Hey," he said, "you're not kidding!"

"Come up and see for yourself," Owens smiled, and switched off.

Mark Langston left his office at a thoroughly respectable speed, hurried down the corridor with scarcely a limp, and caught the lift to the control room. He stepped out and instantly it hit him—the spirit, the *feel* of a ship up against the unknown. He had known that feeling a thousand times in his life, and he responded to it with a spreading grin.

Owens collared him and pulled him toward a knot of men gathered around a subsidiary computer. "Hang on tight, old son," the anthropologist said. "This may be too much for your ancient nervous system—this crate has hit the well-known jackpot."

The men stepped back to make room and Captain Kleberg welcomed Mark by shoving a computer report into his hand. "Take a look at this, Mark," he said, running his fingers through his iron-gray hair. "I've

about decided that the computer's psycho, or we're psycho, or both."

Langston examined the report with a practiced eye. It was a sub-space survey report—normal space being sub-space with respect to their ship, the *Wilson Langford*, in hyperspace—and seemed to be routine enough at first glance. There was the usual co-ordinate check, the drift check, the hydrogen check, the distress beam check—nothing to get excited about. In fact—

Then he saw it.

"But that's impossible," he said.

"Agreed," said Captain Kleberg. "But there it is."

"You figure it out," Owens suggested.

Mark Langston checked the report again carefully. "Is this a gag?" he asked, knowing full well that it wasn't. "There *can't* be a ship down there."

"Just the same," pointed out the Navigation Officer, "thar she blows!"

"Maybe it's the *Flying Dutchman*," Owens offered.

Langston tried to think the thing through logically. But it simply *wasn't* logical. There evidently was some sort of a ship down there, in normal space, light-years out from any planetary system. What was it doing there? How did it *get* there?

"Any distress calls of any sort?" he asked.

"Dead silence," said Captain Kleberg. "And we can't get a *blip* out of her."

"How about positioning?"

"We're almost directly 'above' her," the Navigation Officer reported. "We're practically back-pedaling to keep from losing her."

"How about acceleration?"

"Hard to tell, but I'd guess that she's in free fall. Absolutely no energy tracings at all, and no radiation. She's dead."

Langston let that sink in for a minute. "Have you got a picture yet?" he asked finally.

"They're building one up downstairs," Captain Kleberg said. "It isn't an easy job, of course, but they should be getting something soon."

"Just wait until some of our noble human cargo gets wind of the fact that we're off our course and will miss scheduled landing time by a week or three," Stan Owens chuckled. "We'll have everybody down on us like a pack of hyenas."

"That isn't funny," said Captain Kleberg.

"We'll probably get strung up by our thumbs," Mark Langston said, "while the esteemed officials of the Interstellar Board of Trade dance around the tribal fires and massage our toes with jolly acid."

"That isn't funny either," the harassed captain pointed out.

"Have you met Mrs. Simmons?" asked Stan Owens fiendishly. "A very interesting cultural phenomenon—"

"You and your cultural phenomena," shot back Captain Kleberg.

"You anthropologists think you're so—"

There was a whirring buzz and a three-dimensional mock-up thumped out of a chute. Captain Kleberg snatched it up and put it on a chart table where everyone could get a good look at it.

There was a dead silence in the control room.

"It just can't be," Captain Kleberg said finally, his voice very small.

"No," Mark Langston agreed softly. "But it is."

The men stared at each other, searching for words that were not there.

They came up from the depths, spawned in hate, fed on fury. Collins could smell them, feel the warmth currents from their bodies and the rush and surge of air currents from beating wings. They choked the chamber, filling it, strangling it, shooting up like gas under pressure from the world below.

Like creatures from hell, and yet—

Collins edged back to the mouth of the tunnel and stopped, letting the rest of the rear guard slide into position around him. Differences were forgotten now, melted in the flame of danger. Collins smiled without humor. It was ironic—they respected him only as a fighter—

He floated down to the very floor of the chamber and touched the cold metal. He blanked his mind, watching his chance.

The other men came in high, as they always did, and he felt and smelled and heard the battle in the darkness above him. Knives and clubs and spears collided with clanging crashes and the echoes of harsh breathing filled the chamber with sound. He strained his eyes, trying to see. Something wet and sticky brushed his face—blood pumping in a warm pulsing stream from a punctured artery.

With a blind rage seething within him, a rage as much at himself as his enemies, Collins launched himself from the floor. His nostrils quivered and he angrily choked off a low animal growl of defiance in his throat. He went up, high and hard, his knife extended in front of him. For a long, intolerable instant there was nothing. And then—contact.

Collins cut and slashed with methodical accuracy, giving no warning and no quarter. Like so many men who see fighting for what it is, he cherished no illusions about it and was chillingly effective. His invisible antagonist fought in silence and then stopped, suddenly. Collins moved on, pushing the body away from him. He went up again, slowly, trying to sort the sounds and smells and feelings of battle into some kind of a coherent pattern that would enable him to tell friend from foe. He hesitated, briefly, sensing danger, and then shifted just in time as something hissed past his head and struck his shoulder a numbing blow.

Fighting to see, Collins closed to the attack. The man almost got away from him, but he grabbed a foot and held on. The man suddenly lurched forward and up, and Collins felt the rush of air from his wings. Desperately, he lashed out with his knife. He had to get the mutant before he was smashed against a wall—those fragile wings gave the man an impossible advantage in the open air.

A foot kicked him over and over again, methodically, in the face. There was a complete absence of vocal sound, lending to the combat the unreal deadness of a dream. Collins twisted into position, ignoring the kicking foot, and slashed at a wing. The knife punched home, and Collins carefully ripped the thin membrane to shreds. His opponent faltered. Collins cut him again, and then was pushed away. Collins let him go and dived for the tunnel. He could feel the battle receding around him as the other men began to turn back. The smell of blood was sickening in the still air. His shoulder throbbed with pain and his throat was dry and thick with dust.

Collins darted into the tunnel, gasping for breath, and pushed himself forward. He hadn't gone ten yards before he contacted someone else—going the other way.

A knife whirred past his ear and he caught an arm and twisted. There was only a weak, hopeless resistance. Tired or wounded, or perhaps both, he thought grimly. He moved in for the kill, his own knife ready.

"You're beaten," he whispered. "Surrender."

By way of reply, a hand reached out of the darkness and fingernails clawed at his face. Collins closed in warily, seeking an opening. A cornered animal was always dangerous, he had read, and man was no exception. But he was sick of the killing, sick with horror and the smell of blood. His anger was gone, leaving the man. But he could see no way out. What could you do with such a man? When you gave him a chance for his life, he thanked you with renewed fury. His enemy was not a man, he caught himself thinking. He was an animal—

He raised the knife.

"My spirit will return to destroy you," the man hissed weakly. "My spirit will not forget!"

Suddenly revolted by the thing he had almost done, Collins returned the knife to its sheath.

"You are my prisoner," he said quietly.

The man laughed in his face and clawed him again, feebly. Collins hit him once, wincing as his fist smashed into his jaw, holding on to the other's arm to keep him from floating away. Then he pulled the inert body with him down the tunnel, away from the chamber of death and into the endless darkness and the silence.

After turning the man over to Mal-

colm, and resting briefly in his quarters, Collins swam up through the dark tunnels to the captain's room. He tried the door, found it unlocked, and floated inside.

The captain's torch was burning as always. It was a wonderful thing, as all the special torches were with their combustion draft chambers, but more wonderful still was the soft, steady light from the myriad of stars that were suspended like gleaming jewels in the black velvet of the viewports. Collins drank in their beauty with his eyes and then turned toward the captain.

"Sit down, my boy," the captain said. "I was just having lunch."

The captain was eating alone at the little table in the center of the control room. His long, snow-white hair was silver in the flickering torchlight and his dark eyes flashed in his hard, deeply-lined face. The captain had strapped himself into his chair and fastened the plate and glass to the nailed-down table. It was far simpler to eat while floating, but the captain refused to do so.

Collins slid into the chair across from him and buckled himself in place. He ate in silence for a moment, swallowing the sticky synthetics without relish and washing them down with drafts of water sucked up through a straw from a closed glass.

"We've got to find a way," Collins said finally.

"Yes. We lost a man."

"There *must* be a way."

"There is no way," the captain said slowly. "But we must keep trying."

Collins looked at the captain, his mind tired with worry. The captain was very old now, he thought. Very old, this man who had held them all together for so long. When he was gone—

"They are beginning to slip, my boy," the captain said. "I don't know how much longer we can hold them. They are turning into animals like the rest of them. And when that happens, we are through. The fools! Do they believe that the food and water will last forever? Time, *time*—we must have more time, and it is running out on us."

Collins shrugged. "We're losing the fight as it is," he pointed out. "Let's not kid ourselves. We need more than time, and dreams won't change the situation any."

"You're young yet, my boy," the captain said softly. "There will come a time when dreams will be all you have left."

Collins was nervous, sitting there in the great loneliness with the captain. The turn their conversation had taken worried him, and his worry was tinged with embarrassment. It was not good to sit in on another man's innermost thoughts; that was why there were barriers between human beings. And the captain was so old, sitting there—a shell of a man with his strength eaten away by long years spent in a futile battle. If there had been but one real victory, rather than an endless slow defeat—

But there hadn't been—and yet the captain must not give up, for when he went down they all went down. "This is a real problem, sir," he said, "a problem in science. As such, it has an answer. You've told me that all of my life. If it isn't true—"

"Oh, it's true, it's true," the captain sighed, running a thin hand through his snow-white hair. "It's true as far as it goes. But it isn't just a problem in science we have to face here—it's a problem in human relationships. We

have to solve *that* problem first, and even then I'm no longer sure that we're capable of solving the other. It's been so long—"

"It's impossible," Collins stated flatly, drawing the captain out. "It just couldn't have happened. What could have gone wrong? We've been over it a thousand times, all of us—studied the plans, the records, the theories. There must be an extra factor somewhere, some strange and unknowable—"

"Rubbish!" exclaimed the captain violently, stung out of his apathy. "Let's have no metaphysical gibberish, my boy—not in this room."

"But how *did* it happen?"

"That's not the question," the captain snapped, his eyes flashing again. "The question is, what are we going to do about it? Here we are—accept that. Where do we go from here?"

Collins didn't answer him, for a good and simple reason. There wasn't any answer. The two men sat silently at the strange table in the semidarkness, watching the shadows on the walls and the stars beyond. A cold knot of despair gnawed at Collins' stomach. What chance did they have, really? What were the odds against them? It might be easier to give up, to let yourself drift forever down the soft corridors of thoughtlessness, to forget—

Then he looked at the captain, who watched him wordlessly. *He* had not quit—he had fought and tried and worked and dreamed until his blood grew slow within him and *still* had not surrendered to the shadows and the darkness. He had nagged them and ridiculed them and hurt them—but he had kept them men.

Collins unfastened his belt and floated free of the chair.

"I'm going to see the other man I brought in," he said. "Maybe I can find a lead."

"Good luck, my boy," said the captain softly.

Collins pushed off against a brace and swam into the darkness. All life ended in death, that he knew. But it was how you met that death that made the difference, that marked off finally one man from another. When his turn came, as he sensed it was coming now, he wanted to go out the way a man should—and not like a mindless beast that screamed and struggled in a black vault of emptiness, unloved and alone.

The four men eyed each other over the bottle on Captain Kleberg's private table. All of them occupied chairs, but other than that their positions were remarkably dissimilar. Captain Kleberg sat in a remotely orthodox position, looking, Mark Langston thought, as though his best friend had just strolled in and punched him in the face. Stan Owens, an enigmatic smile playing around the corners of his mouth, had tilted his chair back at a precarious angle and propped his large

and unlovely feet up on the table. Jim McConnell, the lanky chief engineer on the *Wilson Langford*, slouched far down with his long legs extending far underneath the table and his face just about even with the neck of the bottle. Mark Langston had turned his chair backwards and perched on it like a saddle, puffing steadily on a thoroughly venerable pipe and occasionally bombarding all concerned with an ominous cloud of blue smoke.

"Well, gentlemen," said Mark Langston, "we seem to have walked smack into a double-dyed purple whiz."

"You've said that before," Captain Kleberg pointed out gloomily. "I want to know what we're going to *do* about it."

"And just take your time, boys," Owens said airily. "Kleberg can always find another job. He might become a tramp or something."

"They'll grind me up for glue," Captain Kleberg announced unhappily.

Jim McConnell uncoiled somewhat and cocked a finger, pistollike, at his companions. "I'd just like to point out that this conference is getting nowhere fast," he said lazily. "Suppose we either get down to business or get out the cards and be done with it."

"Nice words, Jim," Mark Langston said. "Back them up with something."

"O.K.," agreed McConnell, hanging a cigarette at a miraculous angle out of his mouth, "here's the way I see it. First of all, we've found a derelict. It happens to be the old *Viking*, but what's the difference?"

"What's the difference?" echoed Mark Langston. *The first ship*, his mind whispered. *The first of them all.* "If you meant that, it's a singularly cold remark to make."

"Agreed," Jim McConnell nodded, smiling faintly. "*If* I meant it. I'm just trying to jolt you jokers down to earth, or at least to ship-level. We won't get anywhere with this ah-the-wonder-of-it-all attitude. That dead ship down there *is* the *Viking*, the first of the interstellar ships, the ship that vanished—the ship that was, in fact, an anachronism almost before it got started—but as far as we're concerned it might just as well be the *Mudball X*. With reference to this problem, it's just a ship and the sooner we start looking at it that way the sooner we'll start getting somewhere. End of speech, protected by copyright."

"Don't stop now, Jim," Captain Kleberg said. "Let's see where we get."

McConnell lit a new cigarette from the remnants of its predecessor and shifted his shoulders against the back of the chair until he was comfortable. "Here's the deal then, as I see it," he said slowly. "The *Viking* down there has been unreported for over two hundred years. As far as we can tell, there's no life on her—or at any rate none that's capable of handling her technological equipment. The *Viking* appears to be good and dead. But

when she blasted off, back in the year 2100, she carried a crew of two hundred—one hundred men and one hundred women. Every schoolboy knows their story. First question: Is it possible that anyone is still alive on that ship?"

There was a long silence in Captain Kleberg's room while the four men thought of that lonely ship, alone for centuries, dead and silent and outmoded. A heroic thing, reduced to tragi-comic dimensions by the onrush of technology, and yet—

Mark Langston put his cold pipe on the table and leaned forward. "My guess is yes," he said carefully. "Yes, it's possible."

"Air?" questioned Captain Kleberg doubtfully. "Water? Food? Gravity? The *ship* is dead, you know—there's no question about that part."

Langston nodded. "Yes, I've taken that into account. Look at it this way: First of all, the *Viking* was not, of course, a faster-than-light ship. The trip to Capella was expected to occupy the better part of two hundred years, with the descendants of the original crew finishing the trip. The food would be synthetic, and there would of necessity be plenty. The air supply on the *Viking* was supplied by sealed hydroponic tanks, the valves of which, unless I'm greatly mistaken, were pressure affairs that operated independently of the main power source. I think the air supply would hold out—it's at least possible. The water was carried in tanks and wouldn't be markedly affected by a power failure. Gravity? Well, there wouldn't be any, as far as I can see—"

"Man is a very adaptable animal," Stan Owens said, anticipating him. "He could survive—theoretically at any rate."

"That's it, then," McConnell said. "Until we find out differently, we'll have to assume that there is life of some sort still present in that hulk. Two hundred plus years isn't a fantastic length of time; there may very well be people on that ship. That takes care of our plan of action. It's simple. They're there, trapped. We're here, with a nice new ship. Solution: Go get them and bring them aboard."

Stan Owens' chair hit the floor with a bang.

"Beg pardon," he said, "but that's the one thing we *can't* do."

Mark Langston turned and looked at him.

Stan Owens picked up the empty bottle from the table and jabbed it in McConnell's general direction. "Think a moment, all of you," he said. "This thing isn't quite as simple as it looks and going off half-cocked isn't going to get us anything but a nice soggy fizzle."

"O.K., ape-man," McConnell sighed at the anthropologist. "I might have known that *you* would come up with something complicated. You guys wouldn't fix a bicycle without a field

report and culture analysis."

Mark Langston found himself grinning broadly. It was a good feeling. Up here, with these men, things suddenly began to make sense again. It was not anything concrete, nor could he have put it into words if he had been asked. It was simply that he was once more proud and happy to be a man. Mrs. Simmons and others of her ilk seemed to be denizens of another universe, living in another world—as, in a sense, indeed they were.

Captain Kleberg drummed his fingers on the table. "Well?"

"Look," said Stan Owens patiently. "Let's assume that everything Jim has said is true—if it isn't, if the ship is dead inside as well as out, it doesn't concern us. Let's assume that there are people, human beings, still alive on the *Viking*—people who have lived their entire lives in the darkness, who have never known gravity, who have lived in a world as different from ours as hydrogen is from uranium, who have lived in a static world of death and decay, a world slowly running down—"

A cold chill seemed to seep through the little room like an icy mist. *The children of the* Viking, Mark Langston thought with a feeling akin to awe, *the strange children of the* Viking—

"Let's not have any romantic hogwash, now," Stan Owens continued, waving the empty bottle. "We have no way of knowing how long the *Viking* has been a dead ship, nor do we know what happened to her. But the drive was automatic, wasn't it, Jim?"

McConnell nodded. "That's right. An early atomic drive, kicking up a thrust about equal to a bit less than one-fifth light-year per year in terms of unit distance."

"It wouldn't have just failed," Mark Langston added. "It must have been tampered with."

"Well, that's all conjecture," Owens said slowly. "The important point is that at best that ship has been dead for a good hundred and fifty years, otherwise it would have been contacted by the first faster-than-light ships that tried to hunt her down. That gives us a span of four or five generations living under those upsetting and difficult conditions. Don't fool yourselves, gentlemen—man is not even a constant biologically, and when you get into psychology and culture you can expect practically anything. If there are people on that ship, I don't profess to know anything much about them—but I'll tell you for sure that they won't be like any people you ever saw before."

The other men remained silent, watching him. The great ship around them seemed somehow fragile now, and Mark Langston thought of the infinite sea in which they swam, the dark sea of space that washed the black shores of more mysteries than man could ever know—

"O.K., there they are," Owens went

on. "A hundred and fifty years is a long time—those people, if there are any, have *changed*. By this time they have either adapted themselves to their new environment or else they're long ago *kaput*. We can just forget any drivel about their forgetting where they come from, or who they are, or what they're doing there in the middle of nowhere. Some of them are bound to know—there were books on the *Viking*, certainly, and records, to say nothing of word-of-mouth communication. They'll know, no question about that. Whether they'll all believe it or not is something else again."

Jim McConnell shook his head. "O.K.," he said, "then what's the trouble all about? I still can't see—"

Stan Owens spun the bottle on the table with one hand. "We've got two possibilities," he explained. "One, they know full well what the score is. In that case, their whole lives, their very reason for being, is tied up with the *Viking*—that ship reaching Capella *under her own steam and through her own efforts* is the only thing that can make their living hell mean anything. Take that away from them and they are broken, dead. Take that away from them and you are murderers."

"And if they don't believe?" suggested Captain Kleberg.

"The second possibility is tougher," said Stan Owens. "If they have completely adapted to their new environment, then the shock of putting them on this ship would probably be fatal. The change would be too much; their whole culture, the very fabric of their lives, would be shattered with one blow. Ignoring that little point meant the extinction of more people than I like to think about, on Earth and elsewhere, to say nothing of butcher-wars and revolutions. We are smarter now, or at least we like to think that we are."

Mark Langston nodded at his friend. He had seen enough in his life to back up everything Owens had said, with interest. When you were dealing with human beings, you ignored the human element at your risk. "There's the question of gravity, too," he said.

"Of course," Owens agreed. "If there's been no power on the *Viking* for over a century, and thus no artificial gravity, the sudden change would wipe them out—crush them like flies in a vice. And I dare say that Captain Kleberg wouldn't care to throw this ship into free fall from here to Capella with a load of unconditioned and generally hysterical passengers. We've got a culture too, you know."

Captain Kleberg gave his best approaching-the-guillotine smile. "Don't even think about it," he advised. "We'll all wind up in the funny room. But remember—we've got to make it fast, whatever we do. And no mistakes, of course. This may be a life or death matter for those people, and our own orbital error isn't going to be any joke, even for the computers. I'll hold

this ship in position as long as necessary, but we'll have to get with it. If there are people on that ship—"

"That's enough 'ifs' for one session, I think," smiled Mark Langston, stoking up his pipe again. "This reminds me of that old problem in which some bright boy points to a wastebasket and asks his friends if they'll bet him a million dollars that there isn't a turtle in it. Chances are that there isn't, but how do you know? You can theorize and reason all night, but there's only one way to find out for sure whether or not there is a turtle in there under the daily garbage." He paused, blowing a cloud of blue smoke across the table. "And that one way," he finished, "is to go over and look."

The small but rugged space launch, utterly dwarfed by the vast distances all around her, came down with a wrenching whine—out of hyperspace and into normal sub-space where the dead *Viking* waited. The shock of the transition stunned even the trained crew, and offered convincing evidence of why the great star ship, the *Wilson Langford*, could not be so maneuvered into normal space without a minimum of five days of physical and psychological conditioning for her passengers.

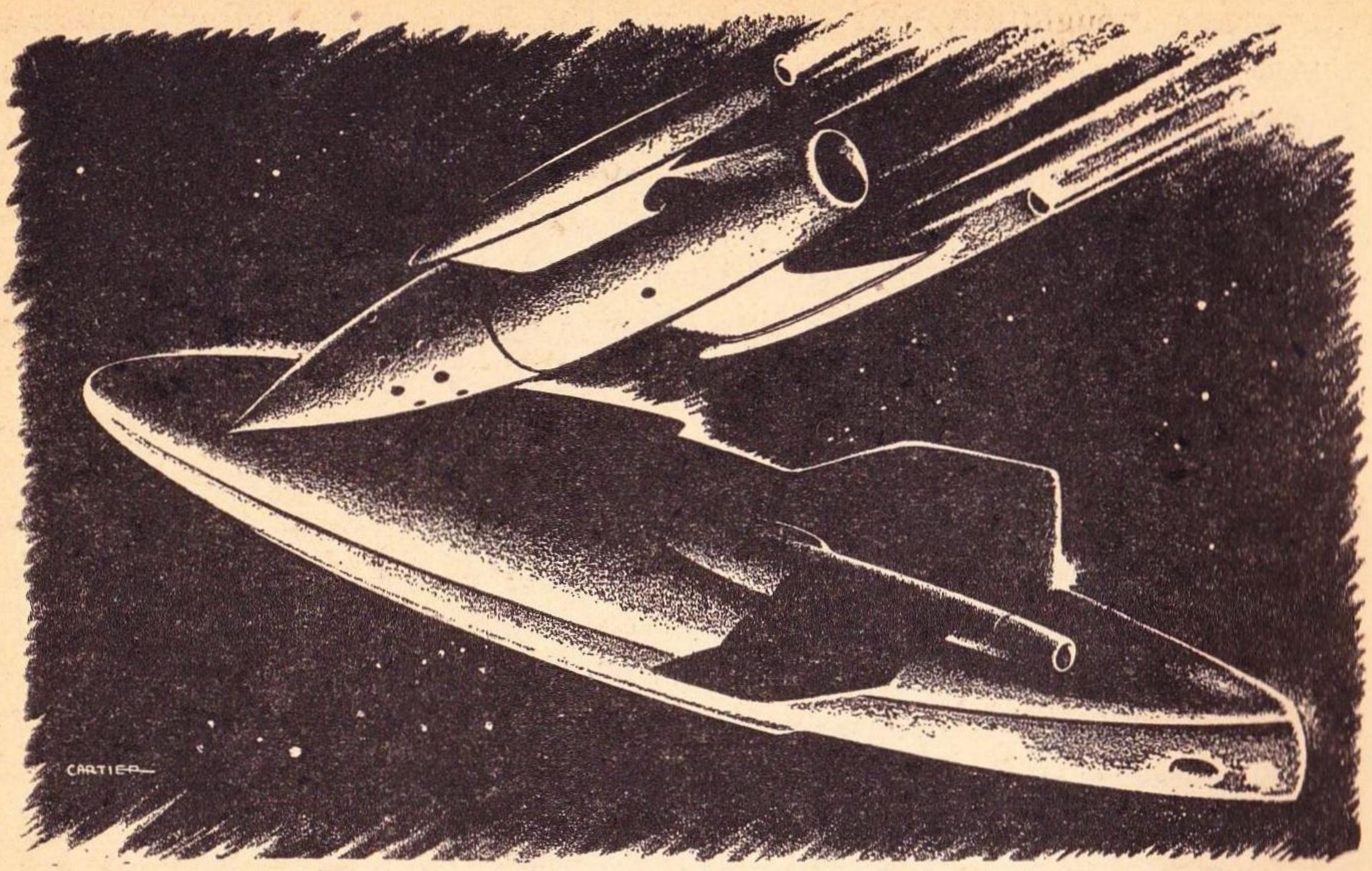
Mark Langston nursed the launch toward the dark shadow of the *Viking*, which was now visible to the naked eye. It floated ahead of them, cold and alone, like a vast creature of the ocean deeps that had grown old and tired and now only floated mindlessly with the currents it once had challenged. Despite the faint throbbing in his bad leg, Mark Langston felt better than he had in a long, long time. He was home, lost in the stars, and the weary years fell away from him one by one and left him young again.

The *Viking* swam nearer, dominating space. Mark Langston guided the launch with well-remembered skill, listening to the hum of conversation behind him.

"I guess my education's been sadly neglected," a voice belonging to one of the forced-entry technicians was saying, "but I swear I don't see why the *Viking* started for Capella in the first place. Why not head for Alpha Centauri? They could have made that in twenty-plus years. Capella, unless it's all hokum put out by the Interstellar Board of Trade to justify extortion rates, is forty-two light-years from Earth."

"It's fairly simple, actually," Stan Owens said. "They didn't head for Alpha Centauri for the same reason you don't go to a zoo when you're looking for a dream-blonde in a bar—it didn't suit their purpose. You have to think back and remember what conditions were like when the *Viking* left Earth. What had they found in the solar system?"

"Same as now, more or less," the man reflected. "Except for what we've built, Mars had those lichens left from better days, Venus her dust cacti, and



that's about it."

"O.K.," Owens continued. "Unless he could reach the stars, man was alone in the universe to all practical purposes. And they were after a planet almost exactly like Earth, only older, following the logic that evolution there would have advanced the planet correspondingly and thus making it possible to harvest the fruits of many thousands—or even *millions*—of years of scientific advancement in just the space of time required to go from Earth to another Earth circling a Class G star of exactly the right specifications. They were hoping, of course, to find a faster-than-light drive to speed up the return trip for their children's children—it seemed like quite an adventure at the time, with fabulous prestige for the crew, and the possible returns to Earth made financing no problem. It just so happened that Capella was the closest star that would serve their ends, and so that was their destination. As we know, it was a wise choice—"

The launch swung alongside the *Viking* and Mark Langston eased her in toward an exact velocity-match. *A wise choice*, he thought, looking at the black tomb before him. *A wise choice, but they couldn't have known that we'd perfect a faster-than-light drive that would render them obsolete before they ever arrived, couldn't have known what was to go wrong with their plans within fifty years there in the mute corridors of the* Viking—

"How about that?" questioned Jim

McConnell thoughtfully. "If we find anyone alive in there, and manage to do anything for them, what becomes of them when they chug into Capella some twenty-thirty years from now and find out that interstellar travel is already old-hat? You talk about destroying their values, Stan, but how do you think they're going to feel when they find out that it's all been for nothing, that they might as well have stayed home?"

The launch hovered next to the black hulk of the *Viking* and Mark Langston swung her abreast of the engine room and clamped her there with gravitraction beams.

"Spacesuits," he said shortly.

"That isn't quite as tough a problem as it looks like," Stan Owens explained as he struggled into his suit. "Remember that these are not the original members of the crew—they are a wholly new group, with new values. If they manage somehow to bring the *Viking* in, that in itself will be enough. Anyhow, in a sense they *are* the first. We've got lots of time before the *Viking* lands, if she does, and we can set the psychology boys to work in that interval. Don't worry—when the *Viking* approaches the Capella system she'll get a hero's—or is it heroine's—welcome that'll put all others to shame, and what's more it'll be completely genuine. There are other distinctions in life besides winning the race, you know."

"You seem to have this all figured to the last decimal point," laughed McConnell, "and we don't even know whether or not the *Viking* is empty. Nothing like looking ahead."

"The time to make your plans is before the action starts," Mark Langston said, talking now through the suit phones. "It's only in quaint types of fiction that the hero strolls thoughtlessly into a hornet's nest and then formulates stunning plans with his brilliant brain while being clubbed to death with crowbars. If he's got brains enough to think his way out of a situation, then he's got brains enough to do a little thinking before he gets up to his neck in hot water."

"You're mixing your metaphors, boy," said Jim McConnell, moving into position. "What happens to all your fine plans if I can't fix the drive on that baby?"

Mark Langston grinned. "One vote for technology," he said.

The efficient team of the launch, spacesuited for protection, swung the emergency air lock and cutter into position between the launch and the dark shell of the *Viking*. McConnell's crew set the cutters with meticulous care. There was a brief whine and the lights dimmed. That was all.

"Let's go," said Mark Langston.

Cautiously, ready for anything, the men moved through the air lock one by one into the black interior of the dead *Viking*.

Four "days" passed. A class was

taught and a battle fought, and an old man spoke with his son—

Floating through the dark tunnels, smelling the cold metal all around him, Collins thought of destiny. Destiny, so the books would have you believe, was what you made of it—fate was up to you. But it was a strange destiny, surely, that had placed him in this dark asylum, protected for the moment against the frigid death outside, even deluded into a kind of comfort, but sinking, always sinking, into a living death in the black shadows below.

Sometimes, it did seem hopeless. Without the captain, he knew, they would be lost—the captain would lead them to safety if anyone could. He thought of the early days of the *Viking*, the early halcyon days that he had read about, when the scientists had lived in a veritable artificial paradise, with unlimited time at their disposal and the company of intelligent, congenial friends to make the long hours pass quickly. Collins wished fervently that he might have lived then, in the golden age—

Ruthlessly, he thrust the thought from his mind. What was it that the captain had said? Man could not move backwards and survive—he must go forward, not to the good old days, but to the good *new* ones.

But how much science had they managed to keep alive? *Was it enough?* Time was running out, and the problems yet to be solved were staggering. What was wrong with the engines? Even if they knew, could they fight their way through the world of the other men to the engine room? *Where was the ship?* If they could manage somehow to bring her to life again, would they have time to go anywhere—go before the synthetics were just a memory and the ship turned into a total horror of starving maniacs? And how long could even the captain bind the men to his will—men who had never known anything but darkness and free flight, men who with each passing "day" became more and more adapted to their ship asylum in the black sea of space and less and less suited for the lives of human beings? Was their fight only a hopeless race up a blind, fantastic alley?

Perhaps the younger men were right—perhaps they should simply treat the other men, with their back sliding primitive culture and superstition, as animals and try to exterminate them to make the synthetics last longer. Perhaps, from the initial revolution down to the present, it had all been their fault—perhaps they should forget about being men, forget about saving the ship, and just make the best of the life with which they were confronted.

Collins shook the thought from his mind. That way only seemed to be the easy way, he knew. That way meant death for all of them. The time would come, the time *must* come, when they

would need those savage people who now crouched around their strange fires in the black world below.

Collins drifted around a corner and there was Malcolm.

Malcolm, now growing old but still with a twinkle in his eye, seemed dignified as always in the light of his small torch. He floated rigidly in the air, his spine unbending and his clothing faultlessly neat as usual.

"I say, Collins," he said briskly, "good to see you."

Collins smiled. Malcolm had discovered from the records that his parents had been British, and he had therefore read all the books he could find upon an incredibly distant England and her people. He had picked up what he fancied to be British phrases, and he used them doggedly—a pathetic thing, to be sure, and a trifle comic, but Collins respected the man's effort to build a desperate individual personality in the midst of chaos. Once he had even tried to find tea, although he hardly knew what it was.

"How's the prisoner?" Collins asked.

"Quite well," Malcolm replied. "He seems to be much stronger now than when you brought him in. Beastly business—what are you going to do with him?"

"Couldn't say," Collins shrugged. "You go and get some sleep and I'll have a talk with our friend, O.K.?"

"Righto," Malcolm said brightly and shoved off down the corridor.

Collins smiled again. Malcolm always made him feel better somehow. He often wondered what the man was like, deep in the innermost corners of his being—what thoughts did he have that he never shared with anyone? There weren't many like Malcolm around any more, and when they were all gone—

Collins unlocked the corridor door and floated in to where the other man waited in the darkness.

The man watched him steadily, without fear. Collins could feel his presence in the room, vibrant, unafraid.

"You have come to kill me," the man stated calmly.

"No," said Collins. "I only want to talk to you—you will not be harmed."

The man laughed in his face.

Collins ignored him and fired a torch. The flame sputtered and caught as the torch built up air pressure, pushing the shadows back and filling the room with warm orange light. Collins narrowed his eyes to slits against the glare and looked at the man. He returned the gaze frankly. He had a strong face, Collins decided. His hair was long and wild and his teeth were sharp and white. His clothing was old and wrinkled, but not unclean. There seemed to be intelligence in his eyes—or was it only the uncertain light from the torch that made it seem so?

"Start talking," the man said shortly. "Or do you always speak

without words?"

"My name is Collins," he said, forcing a smile. "I'm the one who—"

"I remember," the man said.

"Do you have a name, or must I make up one? I'm quite willing to call you Thing or Ug, but maybe you prefer your own name."

"My name is Owens."

"O.K., Owens. Now, look—I'd like to help you if I can. I know you're in a difficult position here—"

"I'll do my worrying," Owens said. "You do yours."

Collins felt himself oddly drawn toward this man before him. A savage? Perhaps. But courage was courage, and even in an enemy it commanded respect.

"You know you could be killed," he told him quietly. "I may not be able to save you for long. Our food supplies are short. I know what would happen to me if I were *your* captive."

"You might make a good meal at that," Owens stated.

"You," Collins informed him, "are not exactly a born diplomat. Doesn't the prospect of death mean anything to you? Your situation is not ideal, you know."

"Neither is yours," the man said surprisingly. "I have known death all my life. I know that it comes whether you are afraid of it or not, so why be afraid? Your own life will soon be over; perhaps you would do well to reserve your charity."

Collins floated toward the man through the shadows, his own eyes cold and hard. He gripped Owens' arm tightly and applied pressure until his fingers ached. Owens did not flinch and continued to meet his gaze squarely.

"What did you mean by that?" whispered Collins tensely. "What do you know about my life?"

"Your world will be dead within twenty sleep periods, and you will die with it," the man said, his voice edged with hate. "The world will be ours."

"Those are big words," Collins said, fingering his knife with his free hand. "But they are only words."

Owens smiled coldly. "You think that we are fools because we do not believe as you do," he said evenly. "You think that we are fools because we know the stars are gods. But we know other things as well, my stupid friend."

"Such as?" suggested Collins, drawing his knife.

"You threaten me?" the savage asked, and laughed.

Collins pressed closer, his heart pulsing in his throat. *What did this man know?*

"The tanks, the air tanks," Owens hissed, his eyes wild and bright. "You think we don't know where the air comes from? We do know, and the tanks are in our part of the world—*we're going to seal you off from your air, and the work has already begun.*"

Collins floated back, stunned. The air—

Before he had a chance to recover himself, the door to the room burst open. Young Lanson hurtled through, his body quivering with excitement.

"There he is, there he is!" Lanson screamed, pointing at Owens. "Kill him!"

"Calm down," Collins snapped. "What's the matter?"

"Matter?" whispered Lanson hoarsely. "You fool, it's the captain, the captain!"

Collins just stared at him, unable to speak.

"Your father is dead," Lanson said, his voice breaking with hysteria. "He's been murdered."

Slowly, inexorably, Collins felt the fury creep through his veins. Not rage, not hot, blinding madness, but *fury*—cold, chill fury that seeped like ice through his body, into his heart, his mind—

The captain—

Shielded now by a wall of ice, his mind took command. He gestured toward Owens. "Bring him," he said shortly, and launched himself into the dark corridor. He left his torch with Lanson and hurtled through the darkness that was his home, his mind refusing even to think of what the captain's death meant to them now. He must think ahead, keep moving—

He swam into the control room, and there was the captain. His chest was red where they had pulled the knife out, and he was very still. His people were clustered around him in the control room and the torch cast broken shadows on the walls, but the captain could not see them. His dead eyes looked outward, out to the silver stars, and now he was alone.

"Dad," said Collins, and his voice was very small. He could not speak further. The captain had been a symbol to him all his life, a force, a principle, that held the ship together. But now, in death, he was only an old man again, an old man with snow-white hair, and Collins was his son.

Collins felt a hand touch his. He looked up to see Helen, his wife, who knew that she could not comfort him but was brave enough to try. Collins squeezed her hand to show that he understood and then turned to his people.

"We will elect a new captain soon," he said quietly. "I will not try to assume the position unless I am asked. We have other problems before us now."

There were murmurs from the crowd, but Collins ignored them. He moved slowly over to where Owens was floating, guarded by Lanson. He looked at Owens coldly for a full minute, staring into his eyes. He waited, smiling very slightly. Then he hit him in the face.

Owens reeled back, shaking his head. Collins hit him again.

"We're going to get through to the engine room," Collins hissed, his face very close to his prisoner's. "This time

we're going to get through, and you're going to take us." He hit him again and watched the blood trickle from a split lip. "Understand?"

Lanson pressed in, knife blade gleaming. "Kill him;" he screamed. "Kill the—"

"Shut up." Collins looked at the man once, and that was enough. "We need our friend here. The other men are blocking off our air supply. This is our last chance. If we fail this time, we die."

The crowd shifted and moved with the shadows and tension filled the air.

"If he won't take us through—" one voice began.

"He'll take us," Collins replied.

"If we can't fix the drive after we get there—"

"We've got to try," Collins said coldly. "I tell you, those engines *couldn't* have failed! They were tampered with, shut off! If one man can turn them off, another can turn them on." He paused. "I'll kill any man who stands in my way."

"I'm on your side, old boy," Malcolm said, and didn't smile.

Collins shot him a glance and then relaxed a little. "Sorry," he said. "I didn't mean to strike any heroic poses."

Malcolm shrugged. "You lead," he said. "I'll follow."

"No, that won't do," Collins pointed "You pick a detail and stay back here—we may not come back, you know. Set the controls, *and make certain that the gravity is adjusted to not more than one-fifth Earth-normal.* Understand?"

"Righto," said Malcolm, and moved off about his task.

"Webb, Renaldo, Echols—you older men who learned your science from the captain—are you with me?"

The men smiled their assent. One muttered something that sounded suspiciously like "At last" and went to get his equipment. Spirit and enthusiasm, as though kindled out of the very air, needing only an initial spark, filled the chamber.

And the old captain floated alone, his dead eyes on the stars—

Collins spun Owens around and twisted the man's arm up behind his back. "O.K.," he whispered. "Let's go."

Lanson hesitated. "Now?"

"Now," said Collins flatly. "We can pick up weapons and synthetics on the way."

Quite suddenly, Owens twisted himself loose. He floated there before them, his keen eyes flashing.

"Fools!" he said clearly. "He would lead you all into death—we would be butchered before we even drew near my people's world. Do you think that my people are imbeciles, that you can simply move in and succeed where all others have failed? Your leader is a fool!"

Collins icily hit the man again in the face. Owens just laughed at him, wiping the blood away with his hand.

"You prove nothing," Owens said

calmly. "You cannot answer my arguments with your fists."

Collins moved in close again and there was death in his eyes. "It's up to you to get us through," he told the man, beginning to feel the doubtslink back into the chamber and take its ugly hold on the people. "If you do not, we'll tear you apart—inch by inch."

Owens hesitated, cold sweat standing out on his forehead.

"There is a way," he said finally. "There is one way—"

Collins gripped his arm, digging his nails into the man's flesh.

"If you cannot go through," Owens pointed out, "you have to go around."

Collins felt his body go dead within him. *Around?* That meant—

"There's only one way," Owens said. "We'll have to go—Outside."

Stars. It was one thing to view them from the shelter of the control room but a different proposition entirely when seen from Outside. Cold they were, and close—it seemed to Collins that he had only to reach out a space-suited hand to pluck an ice-diamond from its field of velvet black. If he should lose his footing, float off into nothingness, forever alone—

He tried not to think about it. If the dark and brooding *Viking* had seemed quiet in her strange Odyssey through the star-seas, how much more was he conscious of the silence now—not merely silence, but an absence of all sound, utter and complete. The old radios of the suits no longer functioned; the air supply was uncertain. Almost Collins fancied that his breathing was already flat and stale.

Inch by inch, foot by slow, agonizing foot the men pulled themselves like ants along the silent side of the *Viking*. Collins could see the monstrous, incredible figure of Owens ahead of him, like a robot-suit without a human being in it. Behind him he sensed his people—Webb, Echols, Renaldo, their equipment strapped to their backs, feeling their way along the emergency guy rod even as he was doing. *Were they good enough?* The thought crept, unbidden, into his mind. *They had worked hard, they were good, but they had learned under terrible handicaps. Their tools were inadequate. Could they fix the drive? If not—*

Getting out of the *Viking* in their old spacesuits had been something of a feat in itself, although the problem was not in getting through the small air lock but in not getting *blown* through it into infinity. Getting back into the ship again through the engine room was, to say the least, going to be something else again. Owens had said that there was an operable air lock there that he had seen, one that could be opened from Outside, but—

Was the man leading them all to their deaths? Was this all simply a last, ironic gesture of defiance?

Collins inched his way along. He had no choice, he realized. It was act

now or not at all. A chance, however desperate, was still a chance. Owens. There was something strange about the man—

Collins stared at the cold metal side of the *Viking* as he crept along it. In there, separated from him by scant feet, were the other men, the children of the revolutionaries. He was in their territory now, their part of the ship, where they gathered around their great synthetic fires and lived their proud but futile lives, sliding back, back, back into a cold death in an empty ship—

Could they be saved, turned to use, if the ship were recovered? Collins had always said that they could, and he believed it. For all their differences, for all their strangeness, these were yet people—people who had chosen to follow a different path from his, but people none the less. A common goal, a common hope, might yet unite the two — and all hands would be needed if the *Viking* were to come through at last.

Collins smiled bitterly. What was that expression he had read in his youth? *Don't count your chickens before they're hatched.* Collins laughed, and the sound was eerily deafening in the closeness of his suit. He had never seen a chicken, and he was unworried about the hatching of an egg. He didn't have any eggs.

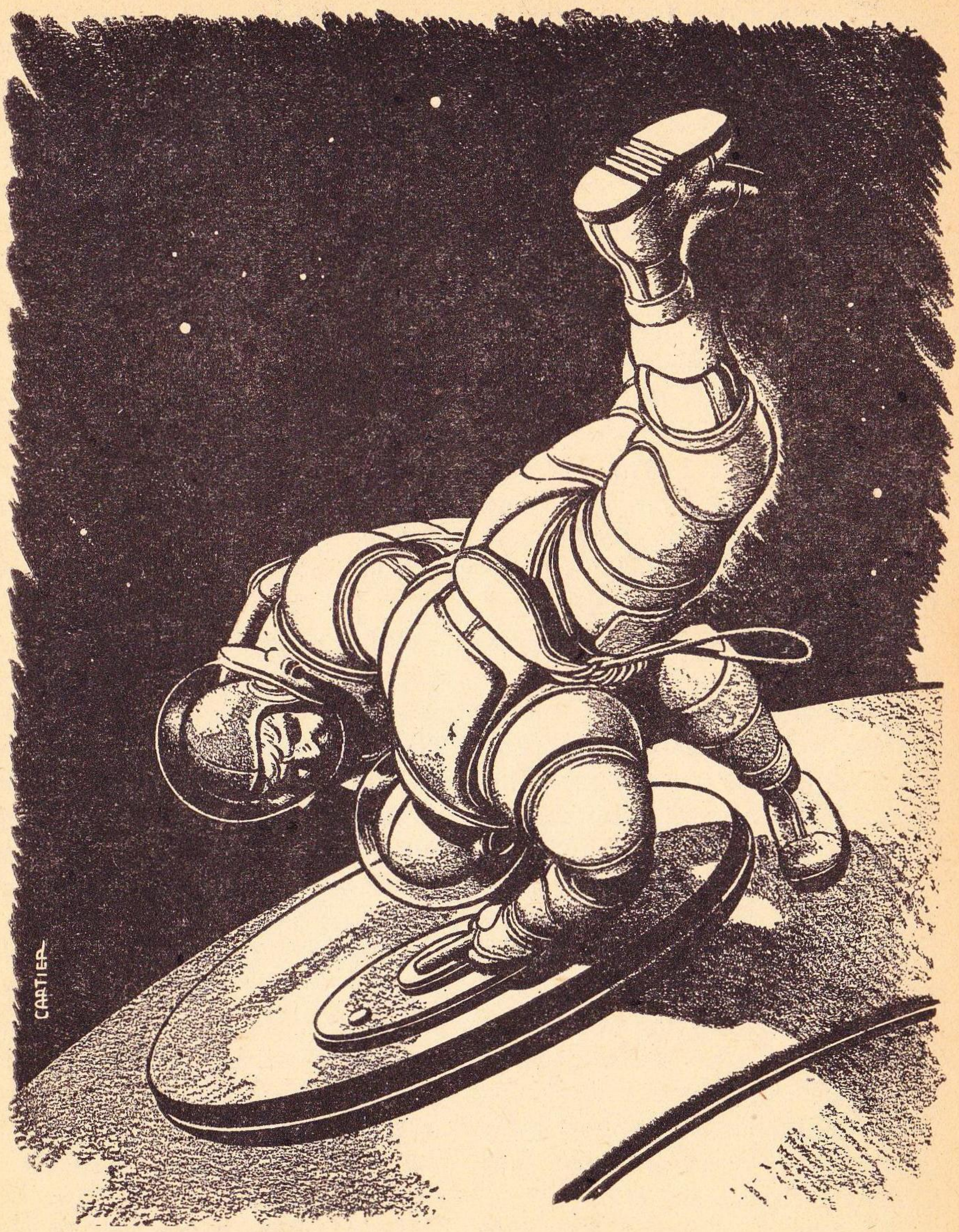
His stomach was a hollow knot within him and the palms of his hands, although beginning to freeze, were clammy with sweat. It seemed to him that he had been crawling for an eternity, crawling forever, crawling through the night and under the merciless stars.

The engine room—Where was the engine room?

They made it. Somehow, they made it. One minute he was crawling inch by inch along the endless guy rod and the next he had stopped, behind Owens. He breathed a cold breath of relief. There, bulging oddly out from the side of the dark *Viking*, was an air lock. Owens had maneuvered himself into position in front of it and was attempting to turn a valve handle. It did not move. Owens waved a gloved hand urgently.

Collins managed to get himself into position next to the other man, and together they twisted at the valve. It didn't budge. Collins felt the cold seeping into his suit and his lungs were choked and constricted. He looked at Owens. Owens looked at him, and for a moment they hung there, motionless, on the brink of eternity.

Then Collins waved to Echols, who slowly made his way over to join them. Wordlessly, Collins fumbled with the pack on Echols' back. It was slow work and his hands were very cold in their thick, insulated gloves, but he finally managed to extract a large hammer. Clumsily, he signaled to Owens and Echols to hold onto him. They braced themselves and got a firm grip on his legs.


CARTIER

Desperately, Collins swung the hammer at the valve. He knew that he might jam it hopelessly, but he had no time now for niceties. The valve had to be jarred loose somehow, and that very quickly. The cold was growing worse—

Collins swung the hammer with as much force as he could muster in his awkward position and then the three men hit the valve together, pulling and tugging and clawing at it with the frenzy and the strength of men who see death staring them icily in the face.

The valve moved. With numbing fingers, they spun it until it would move no more. Then Collins and Owens grasped the handle. Together, they heaved with all their strength.

Nothing happened. The stars seemed to creep nearer—

They pulled again, despair lending strength to their numb muscles. Collins gasped, his heart pounding in his throat. Had it moved? Was it frozen? There—

With a sudden, silent explosion the air lock door puffed outward. The men held on and then moved into the small air lock one by one, almost completely filling it. Coughing for breath and numb with cold, they sealed the outer door again and went to work on the inner one. Collins tasted blood in his throat and a dead whiteness was washing over his brain.

This time, it was easier. The inner door burst open as the ship's air rushed into the air lock and then Collins led his men into the ship. Instantly, without waiting even to look around them, the men ripped off each other's helmet and gulped in great drafts of heady air. Never before in the lives of any of them had air tasted so sweet; never before had they fully realized the ecstasy of breathing.

When he had partially recovered, Collins secured a synthetic torch from Renaldo's pack and coaxed it into flame. Light leaped out, blinding his eyes, and the room jumped into sharp relief. Owens had not lied. Collins felt something that might have been tears start to his eyes as he looked around him.

They were alone in the engine room.

Collins rallied his mind, still somewhat stunned from its brush with an unfamiliar Outside, and set to work. The first requirement was safety and he floated across the chamber and checked the after door. It was closed, but unlocked. He threw the switch on it and then turned back to his companions.

The next necessity was light. Together, the men kindled torches and planted them strategically around the room. The light was flickering and uneven, but it would have to do. Even at that, it hurt their eyes; Collins doubted that they could have stood much more.

He looked around the engine room, and his doubts returned. The main plutonium pile, together with its water

reactant, was of course invisible behind its graphalloy shielding. If the trouble proved to be not at the surface, but deep within the pile itself, Collins knew that the situation was probably hopeless. But he felt a strange exhilaration none the less. Here, at last, was a straight problem in technology—a problem too difficult for his limited means, perhaps, but still a problem he could sink his teeth into.

Collins eyed the shielding and the dials and switches with a feeling akin to awe—not superstitious awe, nor unreasoning wonder, but simply a healthy respect for a supreme accomplishment of his people. This was the power that had lifted the *Viking* long ago from the bonds of Earth, carried her beyond Pluto and into interstellar space—and this was the power that had been silent for more than a century. Had the power failed the men, or had the men failed the power? It was no mere rhetorical problem—upon its solution hinged the fate of Earth's first emissary to the stars.

The men set to work with a will. Collins, Echols, Renaldo, and Webb, the cream of the ship's scientists now that the captain was gone, went at their job with the cool precision of men who have studied and planned for many lonely years for just such an eventuality. Owens stood alone, watching, making no sound, with his face beginning to swell painfully from the blows he had received. The chamber was quiet, but filled with a tense, electric anticipation that was a tangible thing.

Invisible behind its shield, the great pile waited. Outside, hovering beyond the air lock, the stars floated in austere splendor—

The crew of four worked on, absorbed in their problem, oblivious to time. The silence was broken only by the harsh breathing and the short, staccato sentences as the men exchanged information and asked questions. They had pitifully little to go on, with their limited instruments, but they had knowledge and understanding. And they had something else—a burning, unquenchable ferocity of purpose that would not be denied. Man's problems have often been insoluble, from those of the nameless Pleistocene hunters who challenged the mighty mammoth, to Fermi who had engineered the first self-sustaining nuclear reaction beneath the stands of faraway Chicago, to Wilson Langford who had given his life that man might reach the moon of Earth, to a host of others on the black star trails to forever—but they had always been solved.

Man was writing another chapter now—and Collins and his tiny band would not give up.

Time passed as the minutes slipped into hours and the hours crept forward into a day and on—

Finally, they had done all they could.

"It all checks, as far as I can see," said Webb, rubbing his bloodshot eyes, his great beard floating free in the air.

Renaldo nodded. "Someone threw the rods," he agreed. "That's all—there could have been no other failure, or why are the rods in place?"

Echols, thin and pale, said nothing. There was only one thing to try, his expression seemed to say. They must simply try it, and if it failed then that was that.

Collins was the first to look up. Startled, he surveyed the engine room with quick eyes. "Owens," he said quietly. "He's gone."

The others followed his gaze to the air lock door, almost without interest. They had greater problems than Owens to worry about; the man's usefulness was at an end.

"He didn't get out the door into the ship," Renaldo offered. "I would have noticed that. He's gone Outside."

"Why?" speculated Collins, and then let it drop. It could not concern them now.

"I guess we're as ready as we'll ever be," Webb said shortly, a tight little smile on his lips.

"Sequence pull," Collins said.

No man spoke what was in his heart, for there were no words. Even their thoughts were under control; they thought of the problem before them and nothing else.

One by one, the damping control rods were pulled. There were eight of them; Renaldo pulled the last.

Nothing happened. There was a deathly silence.

Collins held his breath. It might be that Malcolm, in the control room, had not followed instructions. Or they themselves had miscalculated. Or—

A tiny, feeble clicking sounded in the room. In the silence, it was almost deafening as each fragile click was magnified in the listeners' imagination until it became a thundering roar.

"The counters," whispered Collins. "The counters—"

With a mounting intensity, the clicks increased in both numbers and strength. They beat a tattoo in the chamber, a tattoo that modulated into a smooth *whir* of power.

Suddenly, there was light—white, blinding light that slashed at the mind and burned into eyeballs.

Someone screamed, then choked it off.

A crushing, terrible force leaped from the floor and smashed the men down. They fell sprawling, gasping for breath, flecks of blood touching the corners of their mouths with crimson. They were pressed into the hard floor—it seemed that they must press through it entirely and out into space to perish.

A humming roar filled the engine room and the great ship, still for numberless years, vibrated with a surge of power and energy.

"Wrong," gasped Echols hoarsely, his mouth pulled out of shape by the terrible pressure. "What went wrong?"

"Nothing," coughed Collins, pulling himself along the floor like a snake. "That's it—don't you see? *Nothing*."

The four men stared at each other then, wincing from the pressure pull and the glare of the white lights. And there, prostrate, in fearful pain, they smiled.

The dead *Viking* had come back from a nameless grave; now, at last, she lived again.

Captain Kleberg, his iron-gray hair neatly combed, leaned back in his chair and with an expression almost of contentment on his face puffed on a pipe which had seen better days. Mark Langston, Jim McConnell, and Stan Owens challenged their chairs in their usual ways and perhaps drank more of Captain Kleberg's Scotch than the rule book strictly allowed.

Mark Langston's leg was throbbing unpleasantly but he ignored it. The murmur of the vibrations, the distant hum of buzzers, the clicking of instruments, the far-off song of the jets—all these were once more blended together into the music he had known. What he had done, and what he had seen, on the dark *Viking* had washed his bitterness away as though it had never existed. He could look his fellow man in the eye again, with pride. That was one of those things you never discussed with anyone, that stayed bottled up within you always—but that was also one of the things that counted in the long run.

"They never would have had a prayer alone," Stan Owens said. "Not a prayer."

"Hardly," agreed McConnell. "It was almost more than we could manage, even with the power unit from the launch, to clear that drive and rig the rods so they could handle them. They wouldn't have had as good a chance as a man trying to build a spaceship with a screw driver."

"From one point of view they were ridiculously overconfident in even trying to get that ship going again," Owens said thoughtfully, sipping his drink. "That was one reason the captain had to go—he knew too much to try. As long as he lived, the situation was static; if he had remained in command we couldn't have done a thing."

The captain. Mark Langston chewed on the stem of his pipe but didn't light it. *He could see the captain now, alone in that great control room, his old eyes alert as he listened to them explaining to him why he had to relinquish his command for the good of his ship. He could hear Owens' quiet voice showing him how his men put their trust in him as a symbol, and waited for him to save them —waited too long. He could hear the captain's slow, careful questions. And he could see—the knife, the sudden knife, the knife they had not been able to stop. The captain, sizing up the situation, had taken his own life to give his people the best possible chance. No man had ever given more—*

McConnell hung a cigarette at an

impossible angle out of his mouth. "You feeling any better?" he asked Owens. "You took quite a beating in there."

Stan Owens fingered his battered face ruefully. "I didn't see any other way to handle it," he said. "Next time I'll just walk through a meat grinder."

Stan Owens. Mark Langston looked at his friend. *It had all been his plan, his responsibility—and he, more than any other man, had brought life again to the lost* Viking. *The old captain, his son Collins, Webb, Renaldo, Echols, the strange and wonderful Englishman Malcolm—these would one day be household names, known to every schoolboy from the saga of the first of the interstellar ships. But who would ever hear the name of Stan Owens, save perhaps as a dimly-remembered legend, a ghost-name? Would historians of the future ever figure out what really had happened on that dark ship—and would they correctly identify Owens as the "savage" who had led Collins to the engine room? Would they puzzle unduly over the extra air lock that had not been present when the ship left Earth? Would they ever understand that a switch had been made with Collins' original prisoner, with Owens taking over with his story of a vanishing air supply to goad the desperate Collins into action?*

It had been a masterly plan, considering the time handicaps under which it was devised and executed. The prisoner they had removed from under old Malcolm's eyes had been closeted and given a strong psychological conditioning—he himself had helped in that—so that he would exert a favorable influence among his people when the ship came to life again.

It would take the Viking *thirty years or more to finish her incredible voyage to Capella—but she would get there and find a subtly-directed welcome that would surpass her wildest dreams. Civilization would thrill to her story, and Collins and Webb and Renaldo and Echols would be immortalized in story, picture, and legend.*

And Stan Owens? Jim McConnell? Captain Kleberg? Members of the complement of the Wilson Langford, *inexcusably late on a standard run from Earth. Except in a few forever-secret records, they would be unknown.*

And it did not matter—that was the best part of it.

Mark Langston came back to the present with a start. He glanced at his watch. Almost time to go back on duty again—

"I want you to know," Jim McConnell was saying, "that I now qualify as an expert on primitive plutonium drives. Me and the boys, we can go roost in a museum in our old age."

"My only regret," said Stan Owens, "is that I have not one report I can give for my profession. Those two halves of the *Viking*, the one oriented around the captain as a symbol of security, the other slipping back into a never-never culture that would de-

light the boys at the Academy, form just about the most magnificent examples of belief systems under stress that have ever gone unrecorded in the annals of—"

"O.K., O.K.," interrupted Captain Kleberg. "We surrender."

Mark Langston dismounted from his chair. "Time for me to be thrown to the wolves," he announced sadly.

McConnell laughed, waving one of his eternal cigarettes in the air. "A reward for a hero," he said cheerfully. "For unprecedented valor, we award to you Mrs. Simmons."

"Thank you," said Mark Langston. "I am overwhelmed."

"Good enough for you, boy," Stan Owens said with a smile. "I'll always believe it was you who fixed that jam on the air lock—you were trying to turn me into an ice cube, and you deserve a fate worse than death."

"Coming right up," Mark Langston assured him. "Dear Mrs. Simmons, the scourge of the spaceways, and that devil's brood of hers, are hot on the trail now that they've found out how late we're running. Poor Raleigh has been fighting her for hours."

"Time to rush in another cavalry troop," Captain Kleberg ordered gravely. "Carry on, Langston—chin up."

Kleberg, Owens, and McConnell applauded wildly as Mark Langston left the room to return to his post. He grinned and limped down the corridor to the lift. One thing was sure—if he was still alive when she came in, he was going to be there to watch the *Viking* land. With that to look forward to, he could stand a lot.

Whistling a thoroughly bawdy and completely off-key tune, Mark Langston marched in to face Mrs. Simmons and extricate young Raleigh from his peril.

Four weeks passed. A ship lived again, and a son spoke to his father—

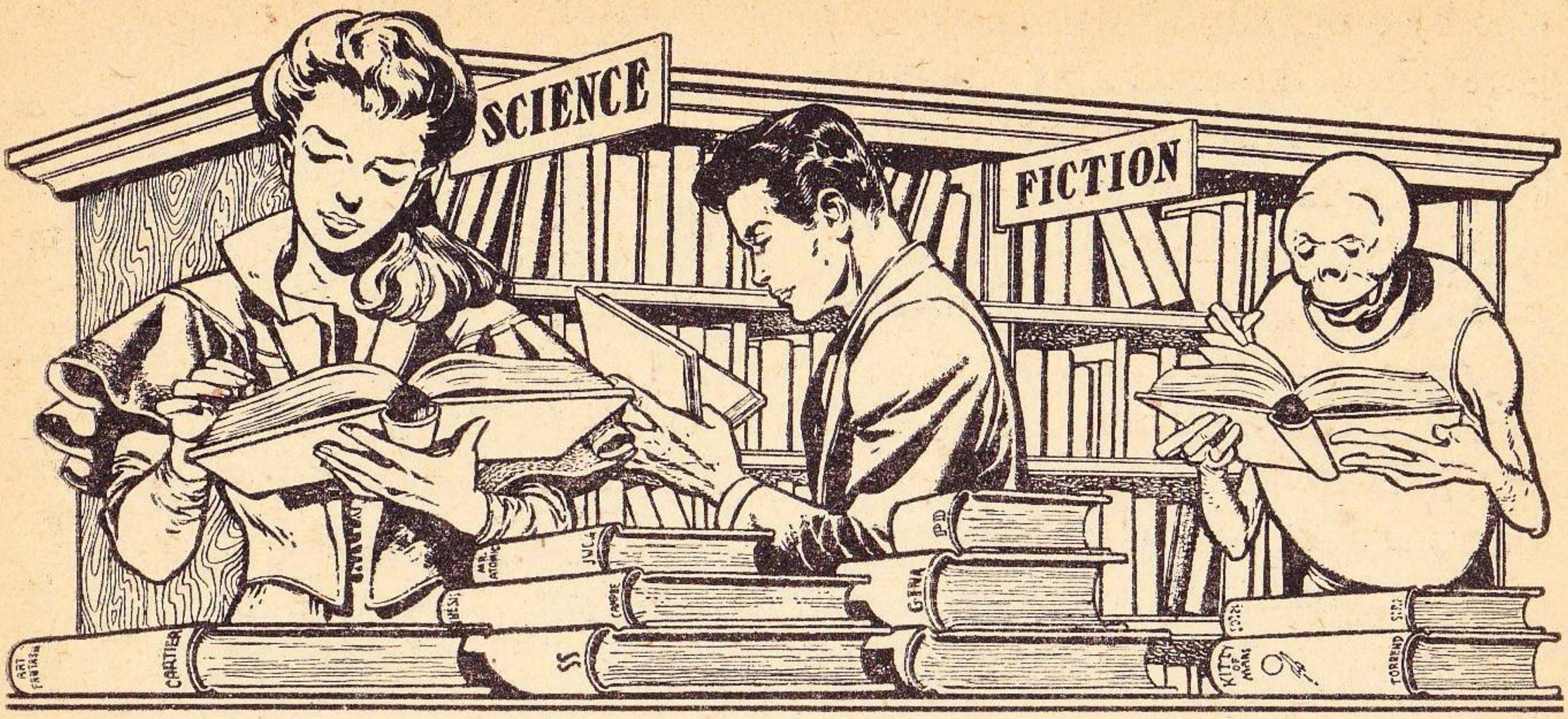
Collins stood alone in the midst of the noise and activity of the control room. The white lights beat down on him and even behind his standard dark glasses his eyes hurt. To every man, woman, and child on the ship, he was the captain now—with one exception. To Collins himself, there would always be only one captain.

He walked carefully over to the viewport, forcing his untrained muscles to carry him through the light gravity. It would be years, he knew, before they could stand one-half normal gravity—but they would make it.

Collins stood alone, looking out at the stars his father had loved. Very softly then, so that only he could hear, he whispered a promise:

"We're coming."

THE END



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BY P. SCHUYLER MILLER

EDITOR'S CHOICE

Science fiction, considered as a movement within the main body of literature, has been clearly the development of a series of popular American magazines during the present century. The role of leadership in this development, and the parallel growth of modern supernatural fantasy, has shifted from one magazine and especially one editor to another. In the early years of the century, and particuarly in the 1920s, it was assumed by the Munsey magazines—*All-Story* and *Argosy* in particular. Later the leadership in fantasy was taken over by *Weird Tales*, and in science fiction by the new *Amazing Stories* and later the various incarnations of *Wonder Stories*—reflections, primarily, of the personal enthusiasm of Hugo Gernsback, their editor and publisher.

Other magazines arose and developed specialized forms of science fiction, such as the space-opera, to a high and often excellent degree, but it cannot easily be gainsaid that during the decade beginning in 1940 leadership in the development of a school of mature, thoughtful, and skillfully written science fiction rested clearly with this magazine under the editorship of John W. Campbell, Jr. That such top-notch writers as Ray Bradbury and Fredric Brown were devel-

oped by other editors does nothing to detract from the effect which Astounding Science Fiction has had on the entire field, and that at least two strong rivals have appeared in the last few years, placing their own individual stamps on the common character of maturity in concept and treatment, should in no way detract from Astounding's decade of vigorous and creative dominance.

"The Astounding Science Fiction Anthology" (Simon and Schuster, New York. 1952. 583 pp. $3.95) is a sampling of those ten years between 1940 and 1951, made by the editor who chose the stories as good in the first place, and who still likes them. Similar selections culled from *Galaxy* and *Magazine of Fantasy and Science Fiction* have appeared almost simultaneously, and will be discussed here next month. Today we're talking about our own editor's choice.

As you may have discovered, I believe in trying to review an author's or an editor's work on the basis of what he has tried to do, and not on what someone else might have thought was a better way of going at it. This means that I am a preface reader, and commend the same practice to you in this case as in others which have been called to your attention from time to time. Often an introduction may be pure sound-and-fury, signifying what Bartlett will point out, but when it is written by a thinking editor it is likely to have something to say.

"Science fiction," John Campbell argues in his introduction to his Anthology, "is the literature of the Technological Era"—our present era. "It, unlike other literatures, assumes that change is the natural order of things, that there are goals ahead larger than those we know. That the motto of the technical civilization is true: 'There must be a better way of doing this!' . . . 'This' is a method of living together; a method of government, a method of thinking, or a method of human relations. Machines and gadgets aren't the end and the goal; they are the *means* to the true goal, which is a better way of living with each other and with ourselves."

The twenty-three stories in this book illustrate how this emphasis has developed in science fiction, through the pages of this magazine, in the last decade. They are not the best stories of those ten years, for what must be a variety of reasons. Some of Heinlein's top-notchers, and others like "In Hiding," have been run into the ground by other editors of other anthologies: every one of you will be able to pick other favorites which might and could have been included. They aren't all ponderous philosophical treatises—because Campbell also points out that in this decade science fiction became *fiction* in the best sense. There are yarns as slight as L. Sprague de Camp's adventure of Johnny Black, "The Exalted," and out-and-out action like H. Beam

Piper's "Last Enemy," old-fashioned BEMs in van Vogt's "Vault of the Beast," and that classic "article" of 1946, Dolton Edwards' "Meihem in ce Klasrum." We have some of the new masters-in-the-making like James H. Schmitz, with the entrancing "Witches of Karres," but we don't have H. M. Kornbluth.

What is striking is that none of these stories are dated. They read as well today as they did when they were first published in these pages. That means that they are definitely good stories first and science fiction afterward. They are stories about people who are confronted with the necessity of coping with change of one sort or another, but who, in general, start with the assumption that they can come out on top. Granted that with these stories have been others which cried doom and issued dire warnings of the consequences of our original sin and general damn-foolishness—and not long ago I argued here that this bitterness and disillusionment is evidence that science fiction is a part of the present main-stream of literature, which has just this flavor of neurosis and protest. But—at least I think this is John Campbell's thesis in making just these selections for this book—there are also stories which make a dynamic response to the need to change, and these are the stories, Campbell says, which are *leading* the trend of modern literature out of pessimism into a new era of human adjustment.

Science fiction worked out in plot, character, and drama the various things which a successful rocket had to do to get men to the moon or the planets. A lot of it was trial and error, especially at first—but writers saw what spaceships *must* do at the same time that scientists and engineers were finding out what rockets *could* do. The two are within sight of each other; they will meet within a decade or so in the first Space Station and the first Lunar Base. They'll be old stuff, fictionwise. And meanwhile other writers in this magazine and other equally mature science-fiction magazines will be working out in such stories as these ways in which men and women *must* learn to live together if they are going to be cooped up for months in an interplanetary rocket, for years in a pressurized shack on Mars, for a lifetime in a try at the stars, and if they are going to build here on Earth a society which will lift Man off the first planet and open Space and Time to him. Because good writers know, intuitively and from experience, how people act and react, these stories will be a valid testing ground for societies to come.

There has been an Astounding type of story just as there has been a *New Yorker* type. It has the features we've been describing. It is usually characterized by understatement, even in its slapstick farce or melodrama. It deals in paradox and double-paradox. It is

smooth, and leads you willingly and unwittingly into traps which may be twists of plot but are more likely to be twists of concept and idea, or even of ideals. It may be as dead-pan as Murray Leinster's "Historical Note," as savage as Theodore Sturgeon's "Thunder and Roses," as furiously frustrating as Lewis Padgett's "When the Bough Breaks," or as blood-and-thunderish as Lawrence O'Donnell's "Clash by Night." But it's smooth, it's professional, it juggles ideas, it tickles at the imagination. It's science fiction.

SLAN, by A. E. van Vogt. Simon and Schuster, New York. 1951. 247 pp. $2.50

"Slan is back!" the advertisements have been shouting—and sure enough, it is. "Slan is hack," Forrest J. Ackerman's own ad is proclaiming—and immediately assuring us that it isn't.

By a purely arbitrary definition, "Slan," which appeared here in 1940, seems old enough to be called a "classic." The first book edition, 1945, was Arkham House's first purely science-fiction venture; it soon sold out, and may have spurred on August Derleth to his recent explorations of the field, as distinct from the rest of fantasy.

"Slan" is—who needs to be told?—A. E. van Vogt's first and most famous novel, perhaps his best—if "Null A" confuses you. Its hero, Jommy Cross the slan boy, is the prototype of the van Vogt hero, working his way through a triply wrapped mystery, gradually discovering his own powers and those of the forces against which he struggles. There is the parallel and interlocking story of the slan girl, Kathleen Layton, mysterious ward of the very dictators who are trying to destroy the mutant race. There are the tendrilless slans—numerous, powerful, and vicious—with the same distorted organs and magnified physical and mental powers as the true slans, but without the telepathic powers of the post-human race "created" by Samuel Lann at least fifteen hundred years before. Little by little the intricate

pattern unfolds, only to grow more complex and puzzling as it is more completely seen.

If you've never read it, you must. If you've worn out your first edition, you'll want this one—somewhat revised. If you're a collector, you have to have it, anyway. And here's an interesting thought—can it be that the phenomenally fleet and strong telepathic race of Wilson Tucker's new "City in the Sea"—reviewed in this issue—is descended from the slans?

THE CITY IN THE SEA, by Wilson Tucker. Rinehart & Co., Inc., New York. 1951. 250 pp. $2.50

Warfare has thrown the world into chaos. Climates have changed; the sea has risen two or three hundred feet, submerging the Atlantic coast of North America and sending an arm of the Gulf of Mexico deep into the heart of the continent. Over the world, through the hundreds and thousands of years, new and mutant varieties of mankind have developed. A matriarchy, centering on the remains of Britain, has begun to expand into the dark continent of Europe and has founded a colony of Western Somerset between the mountains and the sea, from the snows of Maine to the tropical orchards of Florida.

A bronzed, tall man comes out of the unknown lands in the west, down into the eternal cloudland of the rain-drenched coastal camps. He permits himself to be captured and studied; he fills in the blank beyond the ranges with the shoreline of the inland sea, and a star where another city stands—his city. And, for reasons not quite so obvious as it at first appears, Captain Zee, Dr. Barra, and a hundred of their Amazons set out to follow him home.

Wilson Tucker has several good mystery stories to his credit, including his opening *tour de force*, "The Chinese Doll." This is his first hard-shell science-fiction book. Seeing the new lands and their strange races through the eyes of Zee and her women, he follows them in their adventurous trek to the city that is—and is not—"in the sea." There is humor, there is considerable character, there are twists and surprises. All in all, it's very good entertainment.

SCIENCE FICTION OMNIBUS, edited by Everett F. Bleiler & T. E. Dikty. Garden City Books, Garden City, N. Y. 1952. 341 pp. $2.95

They say that everything worth reading in the science-fiction field—and much that isn't—has been anthologized. Now they're anthologizing the anthologies.

This omnibus includes under one pair of covers the first two Bleiler-Dikty "Best Science-Fiction Stories" collections—those of 1949 and 1950, which it will be remembered cover the

magazines of 1948 and 1949 respectively. The jacket illustration is from the second book: the introduction is Melvin Korshak's "Trends in Modern Science Fiction" from "1949," and the preface, justifying the editors' choices, of course covers both. All twelve stories from the first book and all thirteen from the second are here.

Of course it's a bargain, if you don't have the original Fell editions—and you're foolish if you don't, because the Bleiler-Dikty annuals really do the job they set out to do. Where else, under one cover, will you find both "In Hiding" and "Opening Doors," by Wilmar Shiras; four Bradburys; Frederic Brown's "Knock"; Ted Sturgeon's "The Hurkle is a Happy Beast"; Murray Leinster's "Strange Case of John Kingman"—but why go on? Nine magazines were represented; ASF originated in thirty-six per cent of the selections. Competition was beginning to get hot as the reading public began to take science fiction seriously.

THE LOST YEARS, by Oscar Lewis. Alfred A. Knopf, New York. 1951. 121 pp. Ill. $2.50

Thanks to Anthony Boucher for calling attention to this little "biographical fantasy," which describes a few episodes in the last years of a former American president, known to his close friends as "the Shogun," who had been attacked by an assassin in Ford's Theater on the evening of April 14, 1865 but who lived out a bitter last term in the White House, saw himself rejected by his party and his country, and spent a few happy weeks in California before ill health at last took his life late in 1869.

Readers of ASF may recall the collection of—shall we say speculative essays?—edited by John Collins Squire, which was published by the Viking Press in 1931 as "If; or History Rewritten." Its choicest piece is Winston Churchill's "If Lee Had Lost at Gettysburg," in which a writer from a world in which the Confederacy won at Gettysburg tries to imagine the effects of a defeat there. This story of what might have happened if Lincoln had lived belongs in that distinguished company—warm, human, delightful, shaking no worlds, revealing no amazing twists of history, but simply and quietly showing us the dying man who —though the book never says so— signed a California milk-boy's new autograph album, "A. Lincoln."

Mr. Lewis is a California historian and novelist, who has found a way of bringing the Shogun's humanity into relief against the wrangling and bitterness of the post-war world he had been unable to guide or lead into compassion and understanding. Calling such stories gems is trite, but there are semiprecious stones less hard and brilliant but more colorful, warmer and more beautiful than gem-stones. "The Lost Years" is one of these.

IN TIMES TO COME

Thomas Wilson, one of the new authors, has the cover story next month — "The Face of The Enemy." Suppose, when Man gets out into the stars, he finds human beings scattered on the planets of scores of suns — true, Earth-humans. Colonists left behind by an earlier Empire that was smashed. And on a dozen planets, of a dozen suns, the legend of the Golden Age of Empire that was smashed by the attack of the Enemy empire. The vaguely, formlessly described Enemy . . .

It would tend to make every exploring expedition just a little mite cautious as it poked out to yet another world. It would be a strange urge — to explore, for the rest of the Old Empire should be found and united. And dangerous, for it might apprise the Ancient Enemy —

THE EDITOR

THE ANALYTICAL LABORATORY

We have two Lab Reports for this issue — March and April issues both. So —

MARCH ISSUE

Place	*Story*	*Author*	*Points*
1.	Gunner Cade (Pt. 1)	Cyril Judd	2.00
2.	Man Down	Jack Williamson	2.36
3.	Mate In Three Moves	Matthew M. Cammen	3.27
4.	Bluff-Stained Transaction	H. B. Fyfe	4.36
5.	Next Door	Jack Thomas	4.54

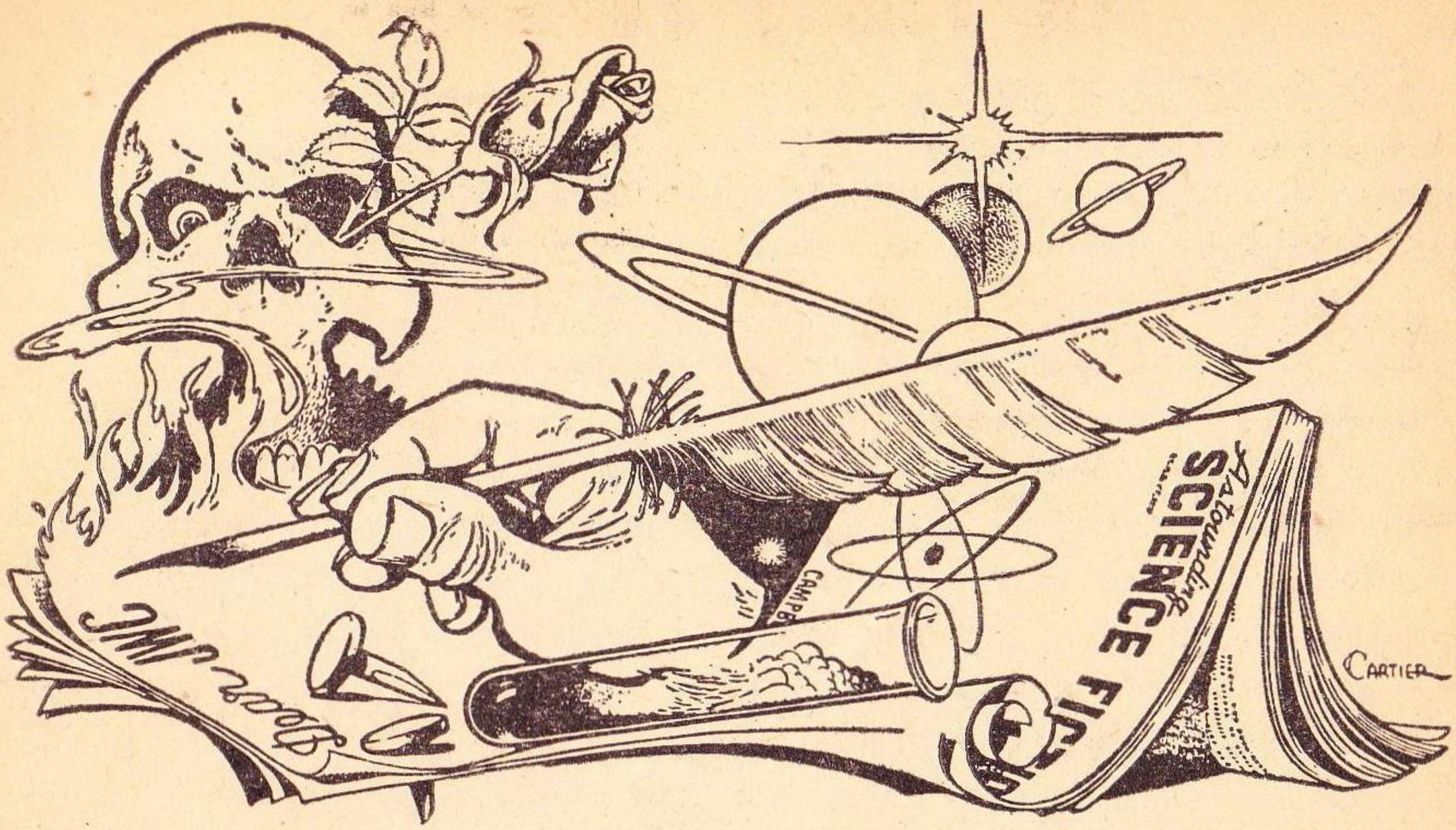
And incidentally, a fairly sizable proportion of the readers pointed out that Jack Thomas slipped in his symbology for the goolgoolplex; he didn't get his exponent big enough. Maybe Thomas slipped over from Next Door where they do it differently . . . ?

APRIL ISSUE

Place	*Story*	*Author*	*Points*
1.	Dumb Waiter	Walter M. Miller, Jr.	1.86
2.	Gunner Cade (Pt. 2)	Cyril Judd	2.11
3.	Cosmophyte	Julian Chain	2.66
4.	Radiation	Kelley Edwards	3.53
5.	The Farthest Horizon	Raymond F. Jones	4.33

"Dumb Waiter" did remarkably well; there were six stories in that issue, and human opinion varying as widely as it does, it is almost an invariable rule that every story gets at least one vote for first place, and at least one for last place. Miller succeeded in ducking the rule; there were no votes on "Dumb Waiter" for anything lower than third place!

THE EDITOR



BRASS TACKS

Dear Mr. Campbell:

Having just read Mr. Berkeley's article "Machine Intelligence," I feel that a recent experience of mine is pertinent and of such general interest as to be worthy of inclusion in "Brass Tacks."

It happened last summer while I was engaged in some heat transfer calculations at the computer laboratory of the local university. I noticed no unusual occurrences in my first contact with the IBM calculating punch. I became acquainted with the system, formulated the method of solution, and prepared the necessary accouterment for the computations. Then, having performed the appropriate neurosurgery to the machine's nerve center, the wired plug boards, I settled down to the routine of the computation stage.

At first I found this to be quite tiresome. The computation was out of my hands—all that was required of me was to remove and replace successive decks of cards when necessary and other completely routine tasks. Then as the machine went through its programming, I settled into a chair and proceeded to peruse the *Gazette* and to catch up on old issues of the *Chemical and Engineering News*. Then the fun began!

In the silence of the surroundings, the clatter of the machine which had at first been quite tedious now began to take on new significance. As I started to recognize minute changes of pitch and slight irregularities of tempo, I realized that the machine had a language. At first I could not translate this machine-talk; but when it occurred to me that this calculator was really only a primitive in the evolution of computers which are yet to come, I began to recognize the jabber as being the equivalent of baby-talk. Soon I recognized phrasings and word groups. And with this came the realization that this was not a mechanical scientist without emotions or feelings. My new-found friend was possessed of the soul of a poet—

In the evenings that followed my companion became more and more understandable. She sang a song as she worked—not the song of the intellectual, but rather a childish, primitive ditty. And this is what she sang:

Zim zum zum zum zum
A cat is a cat is a cat.
Zim zum zum zum zum
A rat is a rat is a rat.
Zim zum zum zum zum
The cat ate the rat ate the rat.
Zim zum zum zum zum
And what do you think of that?
Zim zum zum zum zum
O what a battered cat.
Zim zum zum zum zum
Better to scatter the rat.
Zim zum zum zum zum
And what do you think of that?

Zim zum zum click
Zim zum zum clack
Zim zam zum.*

* (This can be translated "More cards please.")—Norman Fishman, Oakland, California.

Logic is, I suspect, the lowest level of intelligence. And computers are merely logical; you, not the logical machine, supplied the poetry!

Dear John:

I have read with much interest the hypothesis of solar system formation put forward by Mr. Myers in the February issue of ASTOUNDING. The following points struck me as I read it. Like him, I have not checked them all mathematically except where relatively simple arithmetic would serve.

First of all, I seriously doubt that the stars—or rather, any significant number of them—ever had an average separation of "a few light minutes." In the globular clusters to which he refers, the giant stars average roughly a light-year apart in the nucleus. Assuming the ratio between dwarfs and giants at a million to one, which I would say erred on the generous side, the average stellar separation in such a cluster would be fifty or sixty billion miles—three or four light-days. That's not quibbling; that's a terrific distance

when you're operating at the short end of the inverse square law. Instead of saying that the crowding of stars in the nuclei of nebulae is "obvious" in celestial photographs, Mr. Myers might better have called it "apparent." Halation, bad seeing, and the simple fact that a single grain in a photographic emulsion is incomparably vaster than any true geometric star image—which, of course, we don't get anyway, light being what it is—combine to give one a rather misleading picture at a casual glance. The scale we used to give to our general science pupils for stellar distribution in this part of the galaxy was a bunch of tennis balls about twelve hundred miles apart. For the globular cluster above on the same scale, the tennis balls would be about two and a half miles apart.

His observer in the primeval galaxy, therefore, could hardly find the stellar disks overlapping, even nearly. Incidentally, if they did, the stellar structure itself would suffer rather severely; such a situation would mean, in effect, that radiation was not escaping from the system as a whole, and, therefore, that a totally different equilibrium of energy flow from the interiors of the stars would be occurring. A star emerging from such an environment would presumably have adjusted its mass distribution so that it would be supported by gas pressure only, and with the outside radiation pressure ceasing would blow apart. (Thought *not* checked mathematically.)

The sun's present distance from the nucleus of our galaxy appears to correspond to a point well outside that visible in the ordinary photographs of a spiral nebula—in a sense, we are outside what the average amateur astronomer would consider the galaxy proper. What is worse, the sun has a velocity corresponding to a more or less circular orbit about the galactic center; and while random dynamic encounters would tend to reduce an originally high orbital eccentricity, they could hardly complete the job in a dozen or so revolutions—or even in a hundred. It seems doubtful, therefore, that the mass now forming the Solar System was ever significantly closer to the galactic center than it is at present.

The growth by accretion, with light pressure contributing, seems sound—Dr. Whipple at Harvard has expressed some ideas on that subject in the last few years. However, the idea of the growing particles spiraling in toward the sun is more than doubtful; while the body is admittedly increasing in mass, the added mass will have in general enough angular momentum of its own to stay where it is in that respect, unless there is quite a high density gradient outward from the sun. The idea that orbits would be made more eccentric by random collisions simply doesn't square with existing mathematical solutions of that type of problem.

As regards satellites, you can't have it both ways. Apparently Mr. Myers wants Venus to have lost a satellite and most of the other planets acquired theirs by the same general process, but this process is a little obscure. Actually, the capture of a satellite is a vastly unlikely process, and requires the close and well-timed co-operation of more than the two primary bodies. The diagram on page 90, of Venus losing a satellite, has a rather unlikely looking path, to put it mildly. It seems likely that most of the matter now forming satellites never had an angular momentum about the sun differing noticeably from that which went to make up its primary—it was simply a case of several nuclei forming at about the same distance from the sun, and one gaining rapidly on the others—which would be expected, incidentally, from both gravitational and light-pressure mechanisms of accretion.

Why should the vast majority of particles lie near the ecliptic plane? In a crowded environment such as Mr. Myers hypothesizes, there would be tidal disturbances from practically all directions at once. Incidentally, the plane of the ecliptic is just about ninety degrees from that of the galactic equator.

Actually, of course, the whole situation outlined by Mr. Myers calls for really high-powered mathematical investigation. The turbulence set up in the star flow near the edge of the galaxy, for example — well, he's welcome to it. He might get some fun with a pertinent article in last September's *Astrophysical Journal*. I'm afraid I don't have the number, page, or even the author—I'm not located where I can look these things up too conveniently—but there's no mistaking it. It had a lot to say about the development of both galaxies and, to a lesser extent, of planetary systems.

I really didn't mean all the above as destructive criticism, though I see on rereading that it bears more than a slight resemblance thereto. However, I hope Mr. Myers will take it as a challenge to plug what seems to me to be holes in his idea; and if he has evidence which tends to discredit any of my statements, I'd deeply appreciate his bringing it to my attention.—Hal Clement, Bolling Field, Washington, D. C.

Myers wanted discussion—as did I—and this is precisely in line with the needs of a good session!

Dear Mr. Campbell:

I was interested in the January article on "Hydroponics" more than any other article in ASF—or in any other magazine—I have ever seen. Perhaps my interest is boosted because the fact is so many comments on this subject have managed to overlook the real point.

What is "hydroponics?" Actually, it is the science—and that is as good

a term as any—of growing or perpetrating the growth of plant material in an aqueous solution, preferably in water-tight tanks. Its most common use in science fiction is sustenance, both by means of food and of oxygen. Klotzbach seems to be of the opinion a hydroponic garden is more trouble than it's worth.

Not so. If we will stop running madly around, over and under the question and stop to take a good look at it, we will shortly see the main function of a hydroponic garden is *not* to produce actual food for our hardy travelers, but to replenish the oxygen supply, which green plants do very nicely. The food consumed will be mainly vitamin pills, tablets and the like, filled in by bulk of some sort. This bulk need be neither appetizing nor appealing.

Now comes the cry "but it's *hard* to make plants survive!" I refer you to page 97 of the article, where it states: "It may be noted that idle beds manage to grow magnificent weeds without any attention or irrigations whatever." Right you are! For that reason, when our hero becomes hungry he will swallow eight vitamin pills, take six tablets and fill in the empty spaces with a few hurriedly pulled and treated "weeds." And I object to the use of that term. After all, a "weed" is merely a plant we have been too stupid to find a use for.

No, you can't count out hydroponics and say "wait a while until we develop them some more." After all, I'm leaving for Luna tomorrow!—Gregg Calkins, 930 Briarcliff Avenue, Salt Lake City 16, Utah.

But broccoli is so much less scratchy in the throat than ragweed!

Dear Mr. Campbell:

As a teacher of symbolic logic at the State College of Washington I would like to compliment Mr. Kim-Bradley and the editors on "Symbolic Logic and Metamathematics" (ASF February, 1952). It is an excellent popularization of a difficult and interesting subject. One of my students tells me that he enrolled in my current course in symbolic logic as a result of reading this article.

Although the article was extremely accurate in almost all respects, there are a couple of points which I found misleading:

1) Mr. Kim-Bradley states that there is no decision procedure for the functional calculus. This is true, but it should be added that decision procedures exist for important parts of it.

2) A more serious point concerns the provability of Gödel theorems. The article states that Gödel was able to construct propositions that are true but unprovable. One might reasonably ask how these are known to be true if they are not provable. The answer is that these propositions are not *deducible*, but that another technique exists by means of which they can be proved. A metalanguage is constructed which is different from the logical system under consideration, and which is used to talk *about* the system. In the metalanguage Gödel theorems are proved true, though they cannot be deduced in the system in which they are theorems. Thus they can be known to be true because they *can be proved*. But Gödel's results do indeed remain "truly remarkable."

For several years my wife has been an enthusiastic science fiction fan and has unsuccessfully attempted to pass the ASF addiction on to me. But my resistance weakens when I find provocative and educational material so accurately and palatably presented.—Wesley C. Salmon, 140 Hawthorne Circle, Pullman, Washington.

You can't see the shape of the forest while you're among the trees—but you can get a good look at it if you step out and get an exterior viewpoint.

Dear Mr. Editor:

Congratulations on your February issue with those two outstanding articles by Howard L. Myers and Crispin Kim-Bradley. Mr. Myers has certainly given the astronomers much to think about and made a real contribution to scientific thought.

I was very interested in the article on "Symbolic Logic And Metamathematics." Physical science becomes so

complex that new tools of conceptual thought have to be evolved. We no longer deal with a background of euclidean space, simple linear time and solid atoms. New conceptions of space and time do not lend themselves to simple statement in ordinary language. Science becomes increasingly mathematical and now we read of thinking machines. But I believe a thinking machine is a contradiction in terms. A machine can be made to compute, not think, for true thought is creative and purposeful. Much mathematical thought is I agree, purely mechanical. There would be very little progress were it otherwise. As Whitehead says: "Civilization advances by extending the number of important operations which we can perform without thinking about them."

But let us not go to an extreme and assume mathematicians are not thinkers, merely manipulators of symbols, who may be presently replaced by robots. Symbols of mathematics and logic are tools of thought solving problems for us quite beyond the highest powers of ancient thinkers, and great discoverers. They supplement thought, make it infinitely more precise, not redundant.—Bernhard Mollenhauer, 4557 Hawley Blvd., San Diego 16, California.

The major work of the mathematician is not manipulating symbols, anyway, but inventing symbols to manipulate, and methods of manipulating those symbols. Machines can do the manipulating—but minds have to tell it how!

Dear Mr. Campbell:

The committee of the Tenth Anniversary World Science Fiction Convention would like to extend a personal invitation to the readers of ASTOUNDING.

This year's convention, to be held

in Chicago's Morrison Hotel over the Labor Day weekend, August 30, 31, September 1, promises to be outstanding. On the program will be such well known science-fiction personalities as John W. Campbell, Jr., Dr. Joseph A. Winter, Theodore Sturgeon, Hugo Gernsback, Dr. John Pomeroy and many others. The majority of science-fiction authors, editors and publishers will be in attendance.

Unique entertainment with a real science-fiction flavor is being planned, including a ballet, "Asteroid," on an interplanetary theme, danced in ultra-violet light to an original theremin score!

To receive their memberships in the convention and all information, ASTOUNDING readers can send one dollar membership fee to SCIENCE FICTION CONVENTION, Box 1422, Chicago 90, Illinois.—Julian C. May.

Taking a late vacation this year?

Dear Mr. Campbell:

The story "radiation" in the April 1952 issue was *very excellent* except for some minor yet important points.

An error was made by the author in tolerance dosage. All government operated installations have 50 milliroentgen per day or 300 mr per week as the permissible tolerance dosage NOT 100 mr per day. In one part of the story the author miscalculated his dosage as 12 minutes in a 5 R area as being O.K. whereas actually a 1 R dose would be picked up.

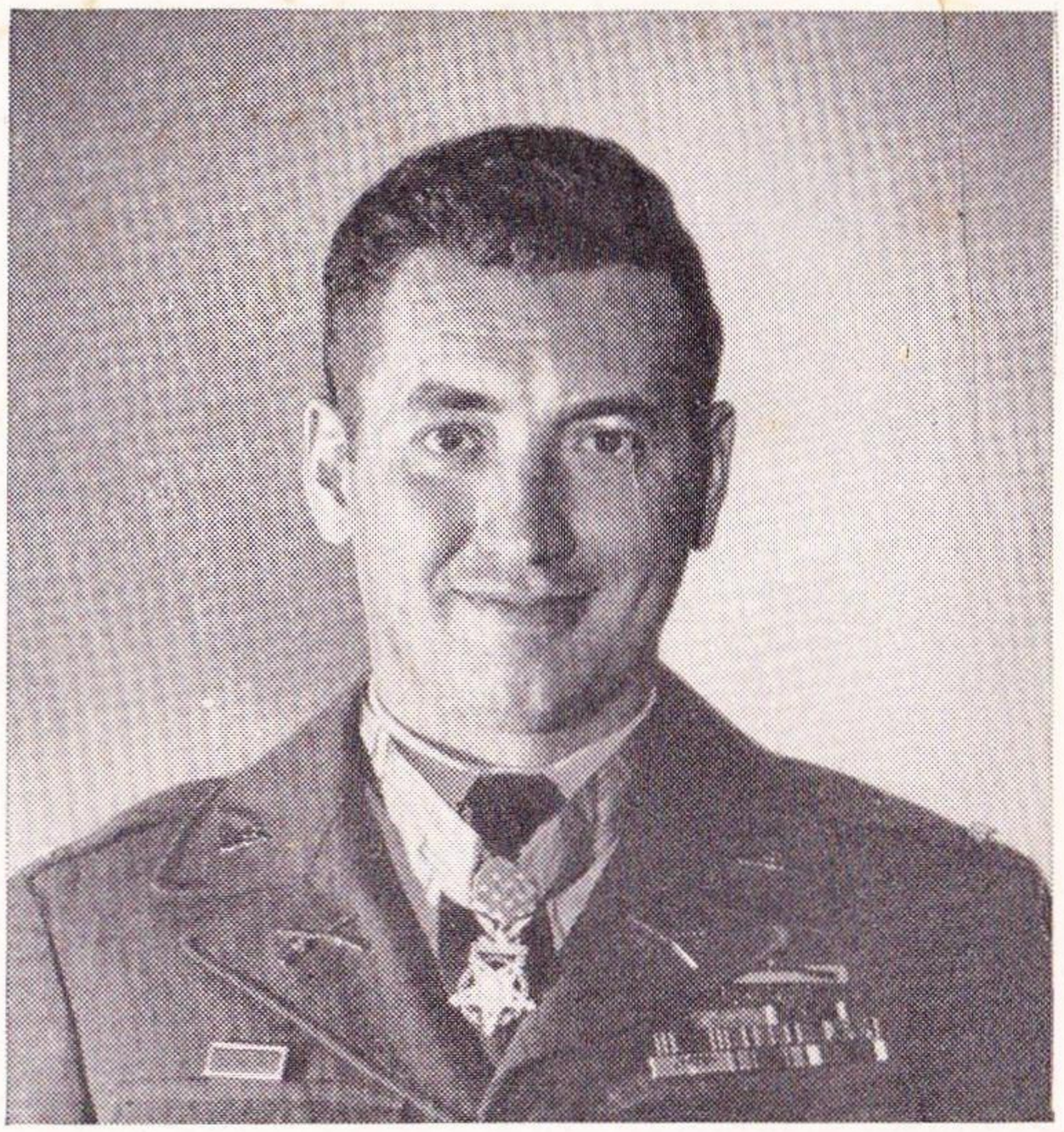
In actual practice I have never seen anyone scared by an overdosage except a newcomer to the nuclear field. In fact without HI men to keep control many men would be careless. In a normal emergency a tolerance dose of 300 mr would be allowed per man; with the men remaining away from radiation for a full week afterwards. The Sunshine being Beta particles caused by gamma rays striking the roof et cetera and producing Beta showers has a tolerance rating twice that of gamma. With proper clothing and face shield this area wouldn't be dangerous at all (Top of the Reactor).

In the case told in this story emergency tolerances of about 3 Roentgen would probably be permissible and possibly higher depending upon the emergency.

As pencils, or pocket chambers, generally are self-reading any overdosage could be read immediately providing the instrument was not off scale. The commonly used pocket chambers have a two hundred mr scale though higher rated instruments can be purchased.—Edwin Kaufman, 1814 N. Vine Street, Hollywood 28, California.

One thing that makes science-fiction writing interesting is the fact that no matter what field you pick, there'll be at least one expert on that field to check up on you!

Lieutenant Stanley T. Adams Medal of Honor



ONE BITING-COLD FEBRUARY NIGHT, Lieutenant Adams was on a bitterly contested hill near Sesim-ni, Korea. Out of the dark earth some 150 Communist troops rose up. Ordering fixed bayonets, the lieutenant, with only 13 men, leaped up and charged furiously. He was knocked down by a bullet. Three hand grenades actually bounced off his body before exploding nearby. But when Adams and his squad were through, there were only 50 Communists left on the hill—and they were dead.

"Nobody likes to kill," says Stanley Adams. "Nobody likes war. But today the surest way to invite a war is to be weak. You and I know that twice in the last ten years Americans have let their guard down. And the Philippine and Korean graveyards are filled with men who paid the price for it.

"Please don't make that tragic mistake again. Remember that in the world today, *peace is only for the strong*. Help make your country and your armed services stronger still—by buying more . . . and more . . . and more United States Defense Bonds. Put *your* bond-power behind *our* fire-power, *now*—and together we'll keep America at peace!"

★ ★ ★

Remember that when you're buying bonds for national defense, you're also building a personal reserve of cash savings. Remember, too, that if you don't save *regularly*, you generally don't save at all. So sign up today in the Payroll Savings Plan where you work, or the Bond-A-Month Plan where you bank. For your country's security, and your own, buy U. S. Defense Bonds now!

Peace is for the strong... Buy U. S. Defense Bonds now!

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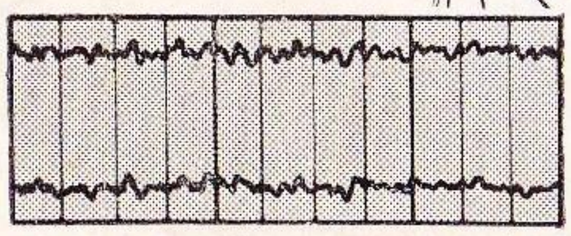
A NEW SCIENTIFIC DISCOVERY

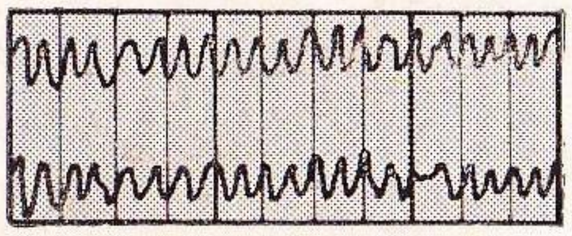
LEARN WHILE YOU SLEEP!

Now, for the first time, it is possible for you to be taught *how* to sleep as well as taught *while* you sleep!

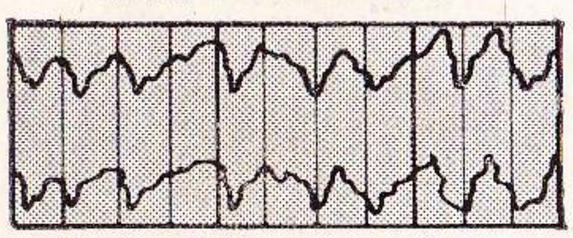
Invention of an ingenious device, DORMIPHONE, by Max Sherover, president of the famous Linguaphone Institute, turned an age-old theory into fact and opened up a new and fascinating avenue of scientific exploration. This new science, called Dormiphonics, is used by educators and phychologists in University laboratories around the world. Their experiments indicate that all of us may soon be able to get an education while we sleep.



Brain in concentrated thought.



Brain in relaxation.

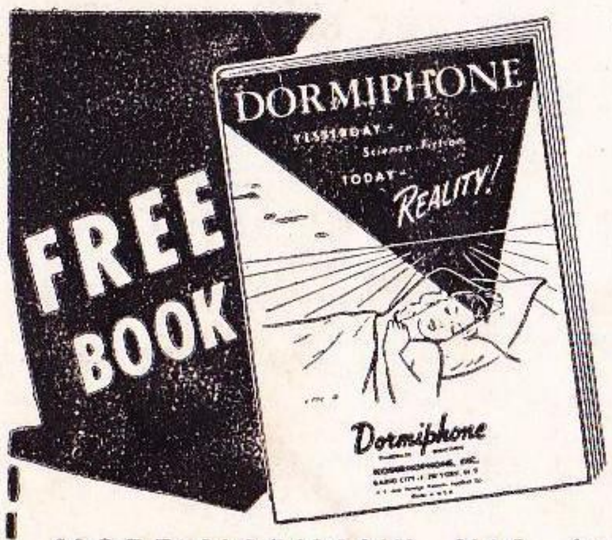


Brain while person sleeps.

VITAL TO EVERY HUMAN BEING

Imagine! No more sleepless nights! . . . Now scientific sleep-inducing guidance helps put you soundly to sleep in minutes! Imagine learning a new language, a role in a play, a speech, tables, formulas, while asleep! Actresses, actors, singers, students, psychologists prove DORMIPHONE can help do this.

Scientific experiments have demonstrated that the part of your sleeping brain which stays awake, hears and remembers iterated speech during sleep—that anything to be memorized can be mastered in less time with the aid of DORMIPHONE.



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DORMIPHONE has freed scientists from guesswork in the study of sleep. Years of primary research have gone into the soporific principle on which the device is based. Now it is ready to turn the one-third of your life you waste sleeping into useful learning time.

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