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"Sixth Column"

By ANSON MacDONALD

JANUARY · 1941

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All stories in this magazine are fiction. No actual persons are designated either by name or character. Any similarity is coincidental.

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ATIC.

INVENTION

ANY science-fiction addict can assure you that the way to win a war is to invent a new weapon. To date, that method has not been very successfully applied—save in the sense of inventing a new way of using previously known weapons. The development of inventions takes time, and no one invention is apt to be overwhelming in power. Science advances by an accretion of small, logical steps; usually if A has made an invention, B is close enough to it to be able to duplicate it from his own previous knowledge which he and A had in common, plus hints gained from the operation of A's unpleasantness.

These considerations do *not* apply in a conflict of two totally alien cultures, as in a first, and military contact between races which have hitherto had no intercourse.

Very occasionally in the history of science, such sudden and terrific advances are possible. Usually, the required pre-existing conditions are faulty communications—as at present exist between belligerent nations—over a period of several years, and a stage of science in which knowledge is just crossing a threshold of some major importance.

Those conditions will exist in the world if the present conflict continues another two years—as it well may. The intentionally restricted communications between major powers exist already. Time is adding the second factor—and at least two fields of research are at a threshold of major importance. The first and most evident is atomic control—I intentionally use the term "atomic control" rather than "atomic power." The latter is as adequate in this connection as a definition of chemistry as the science of how to make matches. Atomic control incorporates atomic power, transmutation, and the further possibilities now unknown, but inherent in the availability of intra-atomic forces.

Anson MacDonald's "Sixth Column" pictures, then, a situation of

fair probability, so far as the effectiveness of invention in the world set-up he presupposes.

The second major field of research now at a threshold stage is ultra-frequency radio. The invention of the klystron—which is a high-frequency oscillator but not remotely parallel in theory or operation to the common radio tube—has made possible the generation of really powerful ultrafrequency currents. The ordinary triode radio tube is physically incapable of frequencies beyond about five hundred million cycles per second; the klystron has already been developed to produce hundreds of watts of power at 20,000,000,000 cycles per second—a wave length of less than two centimeters. They have had this instrument less than a year, really, and have only begun to scratch the surface of its possibilities. These ultra-frequency waves do not behave like "radio waves"; they are intermediate between light and radio, partaking of properties of each. They can be focused like light, but conducted like radio. The currents travel through a nonconductor—and metal conductors are used as insulators! They can be squirted from the end of a metal hose like a jet of water—and no one yet knows what their ultimate possibilities are.

But there is this of interest to Americans in a warring world. The triode amplifier tube that made radio communication practicable was invented by an American; the klystron that extended radio frequencies to new limits was an American invention. Practically every major military naval or aëronautical invention of the past half century was invented by Americans—who, having discovered the principles and applications, then used the excellently good judgment to refrain from applying them. The list of American inventions for military use is far too long for listing, but it parallels in most details American industrial development. Nevertheless, principles exclusively applicable to military purposes have usually originated here.

In a short war, invention has no time to apply its full weight; in a long-term conflict, the role of inventive ingenuity will be powerful, if not ultimately decisive. In as thoroughly unpleasant a world as we now inhabit, there's a definite element of comfort in that. A people with the record for inventive ability that Americans have proven can, if forced to it, make of itself a most terrible enemy.

THE EDITOR.

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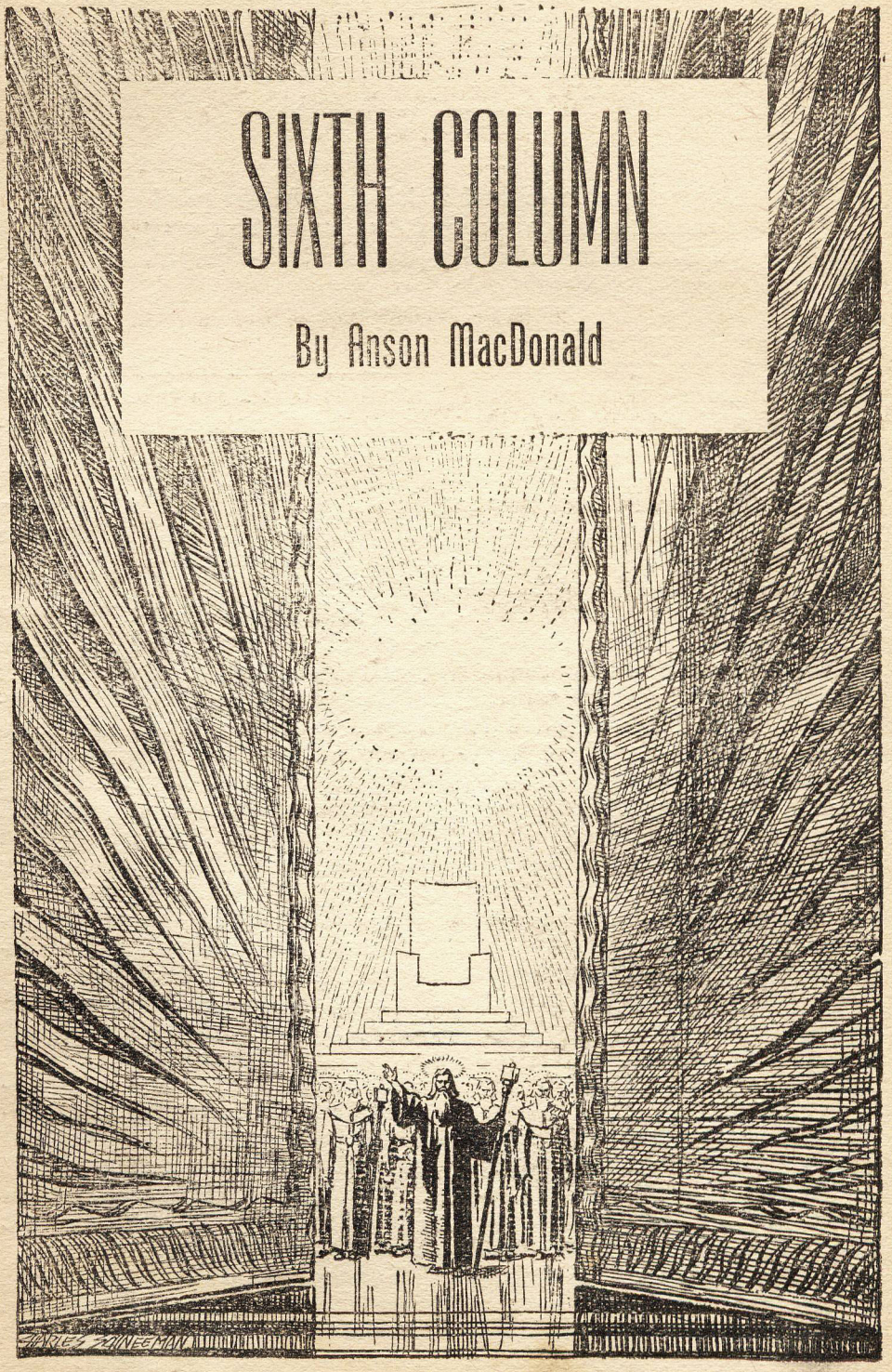
SIXTH COLUMN

By Anson MacDonald



SIXTH COLUMN

By Anson MacDonald

Beginning a three-part serial of a strange rebellion. An utterly conquered America with an army of six men and a mighty—but useless!—weapon.

Illustrated by Schneeman

"WHAT the hell goes on here?" Whitey Ardmore demanded.

They ignored his remark as they had ignored his arrival. The man at the television receiver said, "Shut up. We're listening," and turned up the volume. The announcer's voice blared out: "—Washington destroyed completely before the government could escape. With Manhattan in ruins, that leaves no—"

There was a click as the receiver was turned off. "That's that," said the man near it. "The United States is washed up." Then he added, "Anybody got a cigarette?"

Getting no answer, he pushed his way out of the small circle gathered around the receiver and felt through the pockets of a dozen figures collapsed by a table. It was not too easy, as rigor mortis had set in, but he finally located a half-empty pack, from which he removed a cigarette and lighted it.

"Somebody answer me!" commanded Ardmore. "What's happened here?"

The man with the cigarette looked him over for the first time. "Who are you?"

"Ardmore, major, intelligence. Who are *you?*"

"Calhoun, colonel in research."

"Very well, colonel—I have an urgent message for your commanding officer. Will you please have someone tell him that I am here and see to it that I am taken to him?" He spoke with poorly controlled exasperation.

Calhoun shook his head. "Can't do it. He's dead." He seemed to derive some sort of twisted pleasure from the announcement.

"Huh?"

"That's right—dead. They're all dead, all the rest. You see before you, my dear major, all that are left of the personnel of the Citadel—perhaps I should say of the emergency research laboratory, department of defense, this being in the nature of an official report." He smiled with half his face, while his eye took in the handful of living men in the room.

Ardmore took a moment to comprehend the statement, then inquired, "The Pan-Asians?"

"No. No, not the Pan-Asians. So far as I know, the enemy does not suspect the existence of the Citadel. No, we did it ourselves—an experiment that worked too well. Dr. Ledbetter was engaged in research in an attempt to discover a means of—"

"Never mind that, colonel. Whom does command revert to? I've got to carry out my orders."

"Command? Military command? Good Lord, man, we haven't had time to think about that—yet. Wait a moment." His eye roved around

the room, counting noses. "Hm-m-m—I'm senior to everyone here—and they are all here. I suppose that makes me commanding officer."

"No line officers present?"

"No. All special commissions. That leaves me it. Go ahead with your report."

Ardmore looked about at the faces of the half a dozen men in the room. They were following the conversation with apathetic interest. Ardmore worried to himself before replying over how to phrase the message. The situation had changed; perhaps he should not deliver it at all—

"I was ordered," he said, picking his words, "to inform your general that he was released from superior command. He was to operate independently and prosecute the war against the invader according to his own judgment. You see," he went on, "when I left Washington twelve hours ago we knew they had us. This concentration of brain power in the Citadel was about the only remaining possible military asset."

Calhoun nodded. "I see. A defunct government sends orders to a defunct laboratory. Zero plus zero equals zero. It's all very funny if one only knew when to laugh."

"Colonel!"

"Yes?"

"They are your orders now. What do you propose to do with them?"

"Do with them? What the hell is there to do? Six men against four hundred million. I suppose," he added, "to make everything nice and tidy for the military mind I should write out a discharge from the United States army for everybody left and kiss 'em good-by. I don't know where that leaves me—harikari, perhaps. Maybe you don't get it. This is all the United States there is left. And it's left because the Pan-Asians haven't found it."

Ardmore wet his lips. "Apparently I did not clearly convey the order. The order was to take charge, *and prosecute the war!*"

"With what?"

He measured Calhoun before answering. "It is not actually your responsibility. Under the changed situation, in accordance with the articles of war, as senior line officer present I am assuming command of this detachment of the United States army!"

It hung in the balance for twenty heartbeats. At last Calhoun stood up and attempted to square his stooped shoulders. "You are perfectly correct, sir. What are your orders?"

"WHAT were his orders?" he asked himself. Think fast, Ardmore, you big lunk, you've shot off your face—now where are you? Calhoun was right when he asked "With what?"—yet he could not stand still and see the remnant of military organization fall to pieces.

You've got to tell 'em something, and it's got to be good; at least good enough to hold 'em until you think of something better. Stall, brother, stall! "I think we had best examine the new situation here first. Colonel, will you oblige me by having the remaining personnel gather around—say around that big table? That will be convenient."

"Certainly, sir." The others, having heard the order, moved toward the table. "Graham! And you—what's your name? Thomas, isn't it? You two remove Captain MacAllister's body to some other place. Put him in the corridor for now."

The commotion of getting one of the ubiquitous corpses out of the way and getting the living settled around a table broke the air of unreality and brought things into focus.

Ardmore felt more self-confidence when he turned again to Calhoun. "You had better introduce me to those here present. I want to know what they do and something about them, as well as their names."

It was a corporal's guard, a forlorn remnant. He had expected to find, hidden here safely and secretly away under an unmarked spot in the Rocky Mountains, the most magnificent aggregation of research brains ever gathered together for one purpose. Even in the face of complete military disaster to the regular forces of the United States, there remained a reasonable outside chance that two hundred-odd keen scientific brains, secreted in a hide-away whose very existence was unsuspected by the enemy and equipped with every modern facility for research, might conceivably perfect and operate some weapon that would eventually drive out the Pan-Asians.

For that purpose he had been sent to tell the commanding general that he was on his own, no longer responsible to higher authority. But what could half a dozen men do in any case?

For it was a scant half a dozen. There was Dr. Lowell Calhoun, mathematician, jerked out of university life by the exigencies of war and called a colonel. There was Dr. Randall Brooks, biologist and biochemist, with a special commission of major. Ardmore liked his looks; he was quiet and mild, but gave the impression of an untroubled strength of character superior to that of a more extraverted man—he would do, and his advice would be useful.

Ardmore mentally dubbed Robert Wilkie a "punk kid." He was young and looked younger, having an overgrown collie-dog clumsiness, and hair that would not stay in place. His field, it developed, was radiation, and the attendant branches of physics too esoteric for a layman to understand. Ardmore had not the slightest way of judging whether or not he was any good in his specialty. He might be a genius, but his appearance did not encourage the idea.

No other scientist remained. There were three enlisted men: Herman Scheer, technical sergeant. He had been a mechanic, a die maker, a tool maker. When the army picked him up he had been making precision instruments for the laboratories of the Edison Trust. His brown, square hands and lean fingers backed up his account of himself. His lined, set face and heavy jaw muscles made Ardmore judge him to be a good man to have at his back in a tight place. He would do.

There remained Edward Graham, private first-class, specialist rating officers' cook. Total war had turned him from his profession as an artist and interior decorator to his one other talent, cooking. Ardmore was unable to see how he could fit into the job, except, of course, that somebody had to cook. The last man was Graham's helper, Jeff Thomas, private—background: None. "He wandered in here one day," explained Calhoun. "We had to enlist him and keep him here to protect the secret of the place."

ACQUAINTING Ardmore with the individuals of his "command" had used up several minutes during which he had thought furiously with half his mind about what he should say next. He knew what he had to accomplish, some sort of a shot in the arm that would restore the morale of this badly demoralized group, some of the old hokum that men live by. He believed in hokum, being a publicity man by trade and an army man only by necessity. That

brought to mind another worry—should he let them know that he was no more a professional than they, even though he happened to hold a line commission? No, that would not be very bright; they needed just now to regard him with the faith that the layman usually holds for the professional.

That was the end of the list; Calhoun had stopped talking. Here's your chance, son, better not muff it!

Then he had it—fortunately it would take only a short build-up. "It will be necessary for us to continue our task assignment independently for an indefinite period. I want to remind you that we derive our obligations not from our superior officers who were killed in Washington, but from the people of the United States, through their Constitution. That Constitution is neither captured nor destroyed—it cannot be, for it is not a piece of paper, but the joint contract of the American people. Only the American people can release us from it."

Was he right? He was no lawyer, and he didn't know—but he did know that they needed to believe it. He turned to Calhoun. "Colonel Calhoun, will you now swear me in as commanding officer of this detachment of the United States army?" Then he added, as an apparent afterthought, "I think it would be well for us all to renew our oaths at the same time."

It was a chanted chorus that echoed through the nearly empty room. "'I do solemnly swear—to carry out the duties of my office—and to uphold and defend the Constitution of the United States—against all of its enemies, domestic and foreign!'"

"So help me God."

"'*So help me God!*'"

Ardmore was surprised to discover that the show he had staged had brought tears to his own cheeks. Then he noticed them in Calhoun's eyes. Maybe there was more to it than he had thought.

"Colonel Calhoun, you, of course, become director of research. You are second in command, but I will carry out the duties of executive officer myself in order to leave you free to pursue your scientific inquiries. Major Brooks and Captain Wilkie are assigned to you. Scheer!"

"Yes, sir!"

"You work for Colonel Calhoun. If he does not need all of your services, I will assign additional duties later. Graham!"

"Yes, sir."

"You will continue your present duties. You are also mess sergeant, mess officer, supply officer—in fact, you are the whole commissary department. Bring me a report later today estimating the number of rations available and the condition of perishables. Thomas works for you, but is subject to call by any member of the scientific staff any time they want him. That may delay meals, but it can't be helped."

"Yes, sir."

"You and I and Thomas will perform all duties among us that do not directly apply to research, and will assist the scientists in any way and at any time that they need us. That specifically includes myself, colonel," he emphasized, turning to Calhoun, "if another pair of untrained hands is useful at any point, you are directed to call on me."

"Very well, major."

"Graham, you and Thomas will have to clear out the bodies around the place before they get too high—say by tomorrow night. Put them in an unused room and hermetically seal it. Scheer will show you how." He glanced at his wrist. "Two

o'clock. When did you have lunch?"

"There . . . uh . . . was none today."

"Very well. Graham, serve coffee and sandwiches here in twenty minutes."

"Very good, sir. Come along, Jeff."

"Coming."

As they left, Ardmore turned back to Calhoun. "In the meantime, colonel, let's go to the laboratory where the catastrophe originated. I *still* want to find out what happened here!"

The other two scientists and Scheer hesitated; he picked them up with a nod, and the little party filed out.

"You say nothing in particular happened, no explosion, no gas—yet they died?" They were standing around Dr. Ledbetter's last set-up. The martyred scientist's body still lay where it had fallen, a helpless, disorganized heap. Ardmore took his eyes from it and tried to make out the meaning of the set-up apparatus. It looked simple, but called no familiar picture to mind.

"No, nothing but a little blue flame that persisted momentarily. Ledbetter had just closed this switch." Calhoun pointed to it without touching it. It was open now, a self-opening, spring-loaded type. "I felt suddenly dizzy. When my head cleared, I saw that Ledbetter had fallen and went to him, but there was nothing that I could do for him. He was dead—without a mark on him."

"It knocked me out," offered Wilkie. "I might not have made it if Scheer hadn't given me artificial respiration."

"You were here?" Ardmore asked.

"No, I was in the radiation laboratory over at the other end of the plant. It killed my chief."

Ardmore frowned and pulled a chair out from the wall. As he started to sit down there was a scurrying sound, a small gray shape flashed across the floor and out the open door. A rat, he thought, and dismissed the matter. But Dr. Brooks stared at it in amazement, and ran out the door himself, calling out behind him: "Wait a minute —right back!"

"I wonder what's gotten into him?" Ardmore inquired of no one in particular. The thought flashed through his mind that the strain of events had finally been too much for the mild little biologist.

They had less than a minute to wait in order to find out. Brooks returned as precitately as he had left. The exertion caused him to pant and interfered with articulation. "Major Ardmore! Dr. Calhoun! Gentlemen!" He paused and caught his breath. "My white mice are alive!"

"Huh? What of it?"

"Don't you see? It's an extremely important datum, perhaps a crucially important datum. None of the animals in the biological laboratory were hurt! Don't you see?"

"Yes, but— Oh! Perhaps I do— the rat was alive and your mice weren't killed, yet men were killed all around them."

"Of course! Of course!" Brooks beamed at Ardmore.

"Hm-m-m. An action that kills a couple of hundred men through rock walls and metal, with no fuss and no excitement, yet passes by mice and the like. I've never before heard of anything that would kill a man but not a mouse." He nodded toward the apparatus. "It looks as if we had big medicine in that little gadget, Calhoun."

"So it does," Calhoun agreed, "*if* we can learn to control it."

"Any doubt in your mind?"

"Well—we don't know why it killed, and we don't know why it spared six of us, and we don't know why it doesn't harm animals."

"So— Well, that seems to be the problem." He stared again at the simple-appearing enigma. "Doctor, I don't like to interfere with your work right from scratch, but I would rather you did not close that switch without notifying me in advance." His gaze dropped to Ledbetter's still figure and hurriedly shifted.

OVER the coffee and sandwiches he pried further into the situation. "Then no one really knows what Ledbetter was up to?"

"You could put it that way," agreed Calhoun. "I helped him with the mathematical considerations, but he was a genius and somewhat impatient with lesser minds. If Einstein were alive, they might have talked as equals, but with the rest of us he discussed only the portions he wanted assistance on, or details he wished to turn over to assistants."

"Then you don't know what he was getting at?"

"Well, yes and no. Are you familiar with general field theory?"

"Criminy, no!"

"Well—that makes it rather hard to talk, Major Ardmore. Dr. Ledbetter was investigating the theoretically possible additional spectra—"

"Additional spectra?"

"Yes. You see, most of the progress in physics in the last century and a half has been in dealing with the electromagnetic spectrum, light, radio, X ray—"

"Yes, yes, I know that, but how about these additional spectra?"

"That's what I am trying to tell you," answered Calhoun with a slight note of annoyance. "General field theory predicts the possibility of at least three more entire spectra. You see, there are three types of energy fields known to exist in space; electric, magnetic, and gravitic or gravitational. Light, X rays, all such radiations, are part of the spectrum derived from energy rapidly oscillating between electric and magnetic fields; the electromagnetic spectrum. Theory indicates that similar energy-oscillations between magnetic and gravitic, between electric and gravitic, and, finally, a three-phase oscillation between electric-magnetic-gravitic fields are possible. Each type would constitute a complete new spectrum, a total of three new fields of learning.

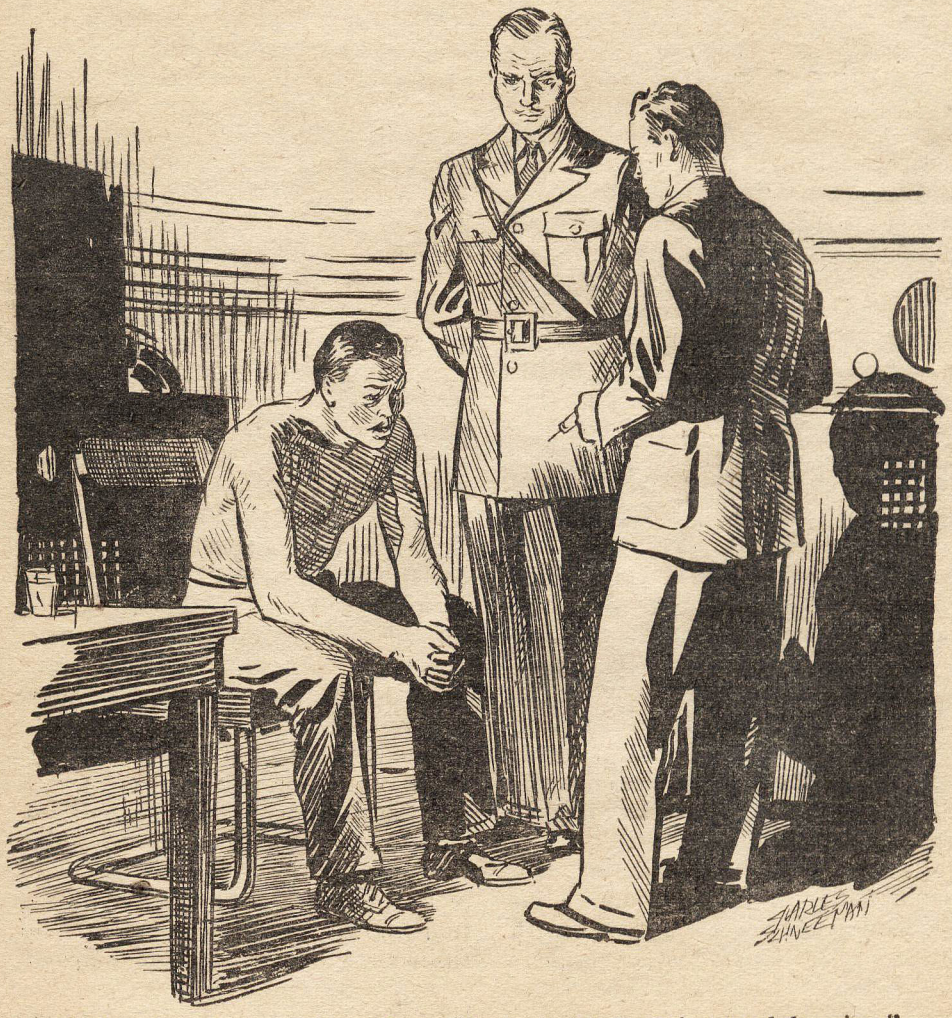
"If there are such, they would presumably have properties quite as remarkable as the electromagnetic spectrum and quite different. But we have no instruments with which to detect such spectra, nor do we even know that such spectra exist."

"Do you know," commented Ardmore, frowning a little, "I'm just a layman in these matters and don't wish to set my opinion up against yours, but this seems like a search for the little man who wasn't there. I had supposed that this laboratory was engaged in the single purpose of finding a military weapon to combat the vortex beams and bombardment rockets of the Pan-Asians. I am a bit surprised to find the man whom you seem to regard as having been your ace researcher engaged in an attempt to discover things that he was not sure existed and whose properties were totally unknown. It doesn't seem reasonable."

Calhoun did not answer; he simply looked supercilious and smiled irritatingly. Ardmore felt put in the wrong and was conscious of a warm flush spreading up toward his face. "Yes, yes," he said hastily, "I know I'm wrong—whatever it was that

Ledbetter found, it killed a couple of hundred men. Therefore it is a potential military weapon—but wasn't he just mugging around in the dark?"

"Not entirely," Calhoun replied, with a words-of-one-syllable air. "The very theoretical considerations that predict additional spectra allow of some reasonable probability as to the general nature of their properties. I know that Ledbetter had originally been engaged in a search for a means of setting up tractor and pressor beams—that would be in the magnetogravitic spectrum—but the last couple of weeks he appeared to be in a condition of intense excitement and radically changed the direction of his experimentation. He was close-mouthed; I got no more than a few hints from the transformations and developments which he had me perform for him. However"—Calhoun drew a bulky loose-leaf notebook from an inner pocket—"he kept complete notes of his experiments. We should be able to fol-



"Give him the antidote, doc. That's truth I can't stand hearing."

low his work and perhaps infer his hypotheses."

YOUNG WILKIE, who was seated beside Calhoun, bent toward him. "Where did you find these, doctor?" he asked excitedly.

"On a bench in his laboratory. If you had looked, you would have seen them."

Wilkie ignored the thrust; he was already eating up the symbols set down in the opened book. "But that is a radiation formula—"

"Of course it is—d'you think I'm a fool?"

"But it's all wrong!"

"It may be from your standpoint; you may be sure that it was not to Dr. Ledbetter."

They branched off into argument that was totally meaningless to Ardmore; after some minutes he took advantage of a pause to say, "Gentlemen! Gentlemen! Just a moment. I can see that I am simply keeping you from your work; I've learned all that I can just now. As I understand it, your immediate task is to catch up with Dr. Ledbetter and to discover what it is that his apparatus does—*without* killing yourselves in the process. Is that right?"

"I would say that is a fair statement," Calhoun agreed cautiously.

"Very well, then—carry on, and keep me advised at your convenience." He got up; the others followed his example. "Oh—just one more thing."

"Yes?"

"I happened to think of something else. I don't know whether it is important or not, but it came to mind because of the importance that Dr. Brooks attached to the matter of the rats and mice." He ticked points off on his fingers. "Many men were killed; Dr. Wilkie was knocked out and very nearly died; Dr. Calhoun experienced only a momentary discomfort; the rest of those that lived apparently didn't suffer any effects of any sort—weren't aware that anything had happened except that their companions mysteriously died. Now, isn't that data of some sort?" He awaited a reply anxiously, being subconsciously afraid that the scientists would consider his remarks silly, or obvious.

Calhoun started to reply, but Dr. Brooks cut in ahead of him. "Of course it is! Now why didn't I think of that? Dear me, I must be confused today. That establishes a gradient, an ordered relationship in the effect of the unknown action." He stopped and thought, then went on almost at once, "I really must have your permission, major, to examine the cadavers of our late colleagues, then by examining for differences between them and those alive, especially those hard hit by the unknown action—" He broke off short and eyed Wilkie speculatively.

"No, you don't!" protested Wilkie. "You won't make a guinea pig out of me. Not while I know it!" Ardmore was unable to tell whether the man's apprehension was real or facetious. He cut it short.

"The details will have to be up to you gentlemen. But remember—no chances to your lives without notifying me."

"You hear that, Brooksie?" Wilkie persisted.

ARDMORE went to bed that night from sheer sense of duty, not because he felt ready to sleep. His immediate job was accomplished; he had picked up the pieces of the organization known as the Citadel and had thrown it together into some sort of a going concern—whether or not it was going any place he was too tired

to judge, but at least it was going. He had given them a pattern to live by, and, by assuming leadership and responsibility, had enabled them to unload their basic worries on him and thereby acquire some measure of emotional security. That should keep them from going crazy in a world which had gone crazy.

What would it be like, this crazy new world—a world in which the superiority of the white man was not a casually accepted "of course," a world in which the Stars and Stripes did not fly, along with the pigeons, over every public building?

Which brought to mind a new worry: If he was to maintain any pretense of military purpose, he would have to have some sort of a service of information. He had been too busy in getting them all back to work to think about it, but he would have to think about it—tomorrow, he told himself, then continued to worry about it.

He got up, wished passionately for just one dose of a barbiturate to give him a night's sleep, drank a glass of hot water instead, and went back to bed.

Suppose they did dig up a really powerful and new weapon? That gadget of Ledbetter's certainly looked good, if they could learn to handle it—but what then? One man couldn't run a battle cruiser—he couldn't even get it off the ground—and six men couldn't whip an empire, not even with seven-league boots and a death ray. What was that old crack of Archimedes? "If I had a lever long enough and a fulcrum on which to rest it, I could move the Earth." How about the fulcrum? No weapon was a weapon without an army to use it.

He dropped into a light sleep and dreamed that he was flopping around on the end of the longest lever conceivable, a useless lever, for it rested on nothing. Part of the time he was Archimedes and part of the time Archimedes stood beside him, jeering and leering at him with a strongly Asiatic countenance.

ARDMORE WAS too busy for the next couple of weeks to worry much about anything but the job at hand. The underlying postulate of their existence pattern—that they were, *in fact*, a military organization which must some day render an accounting to civil authority—required that he should comply with, or closely simulate compliance with, the regulations concerning paperwork, reports, records, pay accounts, inventories, and the like. In his heart he felt it to be waste motion, senseless, yet, as a publicity man, he was enough of a jackleg psychologist to realize intuitively that man is creature that lives by symbols. At the moment these symbols of government were all important.

So he dug into the regulation manual of the deceased paymaster and carefully closed out the accounts of the dead, noting in each case the amounts due each man's dependents "in lawful money of the United States," even while wondering despondently if that neat phrase would ever mean anything again. But he did it, and he assigned minor administrative jobs to each of the others in order that they might realize indirectly that the customs were being maintained.

It was too much clerical work for one man to keep up. He discovered that Jeff Thomas, the cook's helper, could use a typewriter with facility and had a fair head for figures. He impressed him into the job. It threw more work on Graham, who complained, but that was good for him, he thought—a dog needs fleas. He

wanted every member of his command to go to bed tired every night.

Thomas served another purpose. Ardmore's high-strung disposition required someone to talk to. Thomas turned out to be intelligent and passively sympathetic, and he found himself speaking with more and more freedom to the man. It was not in character for the commanding officer to confide in a private, but he felt instinctively that Thomas would not abuse his trust—and he needed nervous release.

Calhoun brought up the matter which forced Ardmore to drop his preoccupation with routine and turn his attention to more difficult matters. Calhoun had called to ask permission to activate Ledbetter's apparatus, as modified to suit their current hypotheses, but he added another and embarrassing question.

"Major Ardmore, can you give me some idea as to how you intend to make use of the 'Ledbetter effect'?"

Ardmore did not know; he answered with another question. "Are you near enough to results to make that question urgent? If so, can you give me some idea of what you have discovered so far?"

"That will be difficult," Calhoun replied in an academic and faintly patronizing manner, "since I am constrained not to speak in the mathematical language which, of necessity, is the only way of expressing such things—"

"Now, colonel, please," Ardmore broke in, irritated more than he would admit to himself and inhibited by the presence of Private Thomas, "you can kill a man with it or you can't, and you can control whom you kill or you can't."

"That's an oversimplification," Calhoun argued. "However, we think that the new set-up will be directional in its effect. Dr. Brooks' investigations caused him to hypothecate an asymmetrical relationship between the action and organic life it is applied to, such that an inherent characteristic of the life form determines the effect of the action as well as the inherent characteristics of the action itself. That is to say, the effect is a function of the total factors of the process, including the life form involved, as well as the original action—"

"Easy, easy, colonel. What does that mean as a weapon?"

"It means that you could turn it on two men and decide which one it is to kill—with proper controls," Calhoun answered testily. "At least, we think so. Wilkie has volunteered to act as a control on it, with mice as the object."

ARDMORE GRANTED permission for the experiment to take place, subject to precautions and restrictions. When Calhoun had gone, his mind returned at once to the problem of what he was going to do with the weapon—if any. And that required data that he did not have. Damn it!—he had to have a service of information; he *had* to know what was going on outside.

The scientists were out, of course. And Scheer, for the scientific staff needed his skill. Graham? No, Graham was a good cook, but nervous and irritable, emotionally not stable, the very last man to pick for a piece of dangerous espionage. It left only himself. He was trained for such things; he would have to go.

"But you can't do that, sir," Thomas reminded him.

"Huh? What's that?" He had been unconsciously expressing his thoughts aloud, a habit he had gotten into when he was alone, or with Thomas only. The man's manner

encouraged using him for a sounding board.

"You can't leave your command, sir. Not only is it against regulations, but, if you will let me express an opinion, everything you have done so far will fall to pieces."

"Why should it? I'll be back in a few days."

"Well, sir, maybe it would hold together for a few days—though I'm not sure of that. Who would be in charge in your absence?"

"Colonel Calhoun—of course."

"Of course." Thomas expressed by raised eyebrows and ready agreement an opinion which military courtesy did not permit him to say aloud. Ardmore knew that Thomas was right. Outside of his specialty, Calhoun was a bad-tempered, supercilious, conceited old fool, in Ardmore's opinion. Ardmore had had to intercede already to patch up trouble which Calhoun's arrogance had caused. Scheer worked for Calhoun only because Ardmore had talked with him, calmed him down, and worked on his strong Teutonic sense of duty.

The situation reminded him of the time when he had worked as press agent for a famous and successful female evangelist. He had signed on as director of public relations, but he had spent two thirds of his time straightening out the messes caused by the vicious temper of the holy harridan.

"But you have no way of being sure that you will be back in a few days," Thomas persisted. "This is a very dangerous assignment; if you get killed on it, there is no one here who can take over your job."

"Oh, now, that's not true, Thomas. No man is irreplaceable."

"This is no time for false modesty, sir. That may be true in general, but you know that it is not true in this case. There is a strictly limited number to draw from, and you are the only one from whom all of us will take direction. In particular, you are the only one from whom Dr. Calhoun will take direction. That is because you know how to handle him. None of the others would be able to, nor would he be able to handle them."

"That's a pretty strong statement, Thomas."

Thomas said nothing. At length Ardmore went on, "All right, all right—suppose you are right. I've got to have military information. How am I going to get it if I don't go myself?"

Thomas was a little slow in replying. Finally he said quietly, "I could try it."

"You?" Ardmore looked him over and wondered why he had not considered Thomas. Perhaps because there was nothing about the man to suggest his potential ability to handle such a job—that, combined with the fact that he was a private, and one did not assign privates to jobs requiring dangerous independent action. Yet perhaps—

"Have you ever done any work of that sort?"

"No, but my experience may be specially adapted in a way to such work."

"Oh, yes! Scheer told me something about you. You were a tramp, weren't you, before the army caught up with you?"

"Not a tramp," Thomas corrected gently, "a hobo."

"Sorry—what's the distinction?"

"A tramp is a bum, a parasite, a man that won't work. A hobo is an itinerant laborer who prefers casual freedom to security. He works for his living, but he won't be tied down to one environment."

"Oh, I see. Hm-m-m—yes, and I

begin to see why you might be especially well adapted to an intelligence job. I suppose it must require a good deal of adaptability and resourcefulness to stay alive as a hobo. But wait a minute, Thomas— I guess I've more or less taken you for granted. I need to know a great deal more about you, if you are to be intrusted with this job. You know, you don't *act* like a hobo."

"How does a hobo act?"

"Eh? Oh, well, skip it. But tell me something about your background. How did you happen to take up hoboing?"

Ardmore realized that he had, for the first time, pierced the man's natural reticence. He fumbled for an answer, finally replying, "I suppose it was that I did not like being a lawyer."

"What?"

"Yes. You see, it was like this: I went from the law into social administration. In the course of my work I got an idea that I wanted to write a thesis on migratory labor, and decided that in order to understand the subject I would have to experience the conditions under which such people lived."

"I see. And it was while you were doing your laboratory work, as it were, that the army snagged you."

"Oh, no," Thomas corrected him, "I've been on the road more than ten years. I never went back. You see, I found I liked being a hobo."

THE DETAILS were rapidly arranged. Thomas wanted nothing in the way of equipment but the clothes he had been wearing when he had stumbled into the Citadel. Ardmore had suggested a bedding roll, but Thomas would have none of it. "It would not be in character," he explained. "I was never a bindlestiff. Bindlestiffs are dirty, and a self-respecting hobo doesn't associate with them. All I want is a good meal in my belly and a small amount of money on my person."

Ardmore's instructions to him were very general. "Almost anything you hear or see will be data for me," he told him. "Cover as much territory as you can, and try to be back here within a week. If you are gone much longer than that, I will assume that you are dead or imprisoned, and will have to try some other plan.

"Keep your eyes open for some means by which we can establish a permanent service of information. I can't suggest what it is you are to look for in that connection, but keep it in mind. Now as to details: Anything and everything about the Pan-Asians, how they are armed, how they police occupied territory, where they have set up headquarters, particularly their continental headquarters, and, if you can make any sort of estimate, how many of them there are and how they're distributed. That would keep you busy for a year, at least; just the same, be back in a week."

Ardmore showed Thomas how to operate one of the outer doors of the Citadel; two bars of "Yankee Doodle," breaking off short, and a door appeared in what seemed to be a wall of country rock—simple, and yet foreign to the Asiatic mind. Then he shook hands with him and wished him good luck.

Ardmore found that Thomas had still one more surprise for him; when he shook hands, he did so with the grip of the Dekes, Ardmore's own fraternity! Ardmore stood staring at the closed portal, busy rearranging his preconceptions.

When he turned around, Calhoun was behind him. He felt somewhat as if he had been caught stealing

jam. "Oh—hello, doctor," he said quickly.

"How do you do, major," Calhoun replied with deliberation. "May I inquire as to what is going on?"

"Certainly. I've sent Lieutenant Thomas out to reconnoiter."

"Lieutenant?"

"Brevet lieutenant. I was forced to use him for work far beyond his rank; I found it expedient to assign him the rank and pay of his new duties."

Calhoun pursued that point no further, but answered with another, in the same faintly critical tone of voice. "I suppose you realize that it jeopardizes all of us to send anyone outside? I am a little surprised that you should act in such a matter without consulting with others."

"I am sorry you feel that way about it, colonel," Ardmore replied, in a conscious attempt to conciliate the older man, "but I am required to make the final decision in any case, and it is of prime importance to our task that nothing be permitted to distract your attention from your all-important job of research. Have you completed your experiment?" he went on quickly.

"Yes."

"Well?"

"The results were positive. The mice died."

"How about Wilkie?"

"Oh, Wilkie was unhurt, naturally. That is in accordance with my predictions."

JEFFERSON THOMAS, Bachelor of Arts *magna cum laude,* University of California; Bachelor of Law, Harvard Law School, professional hobo, private and cook's helper, and now a brevet lieutenant, intelligence, United States army, spent his first night outside shivering on pine needles where dark had overtaken him. Early the next morning he located a ranchhouse.

They fed him, but they were anxious for him to move along. "You never can tell when one of those yellow heathens is going to come snooping around," apologized his host, "and I can't afford to be arrested for harboring refugees. I got the wife and kids to think about." But he followed Thomas out to the road, still talking, his natural garrulity prevailing under his caution. He seemed to take a grim pleasure in bewailing the catastrophe.

"God knows what I'm raising those kids up *to.* Some nights it seems like the only reasonable thing to do is to put them all out of their sorrow. But Jessie—that's my wife—says it's a scandal and a sin to talk that way, that the Lord will take care of things all in His own good time. Maybe so—but I know it's no favor to a child to raise it up to be bossed around and lorded over by yellow monkeys." He spat. "It's not American."

"What's this about penalties for harboring refugees?"

The rancher stared at him. "Where've you been, friend?"

"Up in the hills. I haven't laid eyes on one of the so and so's yet."

"You will. But then you haven't got a number, have you? You'd better get one. No, that won't do you any good; you 'u'd just land in a labor camp if you tried to get one."

"Number?"

"Registration number. Like this." He pulled a glassine-covered card out of his pocket and displayed it. It had affixed to it a poor but recognizable picture of the rancher, his fingerprints, and pertinent data as to his occupation, marital status, address, et cetera. There was a long, hyphenated number running across

the top. The rancher indicated it with a work-stained finger. "That first part is my number. It means I have permission from the emperor to stay alive and enjoy the air and sunshine," he added bitterly. "The second part is my serial classification. It tells where I live and what I do. If I want to cross the county line, I have to have that changed. If I want to go to any other town than the one I'm assigned to do my marketing in, I've got to get a day's special permit. Now I ask you—is that any way for a man to live?"

"Not for me," agreed Thomas. "Well, I guess I had better be on my way before I get you into trouble. Thanks for the breakfast."

"Don't mention it. It's a pleasure to do a favor for a white man these days."

He started off down the road at once, not wishing the kindly rancher to see how thoroughly he had been moved by the picture of his degradation. The implications of that registration card had shaken his free soul in a fashion that the simple, intellectual knowledge of the defeat of the United States had been unable to do.

He moved slowly for the first two or three days, avoiding the towns until he had gathered sufficient knowledge of the enforced new customs to be able to conduct himself without arousing suspicion. It was urgently desirable that he be able to enter at least one big city in order to snoop around, read the bulletin boards, and find a chance to talk with persons whose occupations permitted them to travel. From a standpoint of personal safety he was quite willing to chance it without an identification card, but he remembered clearly a repeated injunction of Ardmore, "Your paramount duty is to return! Don't go making a hero of yourself. Don't take any chance you can avoid and *come back!*"

Cities would have to wait.

THOMAS SKIRTED around towns at night, avoiding patrols as he used to avoid railroad cops. The second night out he found the first of his objectives, a hobos' jungle. It was just where he had expected to find it, from his recollection of previous trips through the territory. Nevertheless, he almost missed it, for the inevitable fire was concealed by a jury-rigged oilcan stove, and shielded from chance observation.

He slipped into the circle and sat down without comment, as custom required, and waited for them to look him over.

Presently a voice said plaintively, "It's Gentleman Jeff. Cripes, Jeff, you gave me a turn. I thought you was a flatface. Whatcha been doin' with yourself, Jeff?"

"Oh, one thing and another. On the dodge."

"Who isn't these days?" the voice returned. "Everywhere you try, those slant-eyed—" He broke into a string of attributions concerning the progenitors and personal habits of the Pan-Asians about which he could not possibly have had positive knowledge.

"Stow it, Moe," another voice commanded. "Tell us the news, Jeff."

"Sorry," Thomas refused affably, "but I've been up in the hills, kinda keeping out of the army and doing a little fishing."

"You should have stayed there. Things are bad everywhere. Nobody dares give an unregistered man a day's work, and it takes everything you've got just to keep out of the labor camps. It makes the big Red hunt look like a picnic."

"Tell me about the labor camps,"

Thomas suggested. "I might get hungry enough to try one for a while."

"You don't know. Nobody *could* get that hungry." The voice paused, as if the owner were turning the unpleasant subject over in his mind. "Did you know the Seattle Kid?"

"Seem to recall. Little squint-eyed guy, handy with his hands?"

"That's him. Well, he was in one, maybe a week, and got out. Couldn't tell us how; his mind was gone. I saw him the night he died. His body was a mass of sores, blood poisoning, I guess." He paused, then added reflectively, "The smell was pretty bad."

Thomas wanted to drop the subject, but he needed to know more. "Who gets sent to these camps?"

"Any man that isn't already working at an approved job. Boys from fourteen on up. All that was left alive of the army after we folded up. Anybody that's caught without a registration card."

"That ain't the half of it," added Moe. "You should see what they do with unassigned women. Why, a woman was telling me just the other day—a nice old gal; gimme a handout. She was telling me about her niece. It seems this niece used to be a schoolteacher, and the flat-faces don't want any American schools or teachers. When they registered her they—"

"Shut up, Moe. You talk too much."

It was disconnected, fragmentary, the more so as he was rarely able to ask direct questions concerning the things he really wanted to know. Nevertheless he gradually built up a picture of a people being systematically and thoroughly enslaved, a picture of a nation as helpless as a man completely paralyzed, its defenses destroyed, its communications entirely in the hands of the invaders.

Everywhere he found boiling resentment, a fierce willingness to fight against the tyranny, but it was undirected, unco-ordinated, and, in any modern sense, unarmed. Sporadic rebellion was as futile as the scurrying of ants whose hill has been violated. Pan-Asians could be killed, yes, and there were men willing to shoot on sight, even in the face of the certainty of their own deaths. But their hands were bound by the greater certainty of brutal multiple retaliation against their own kind. As with the Jews in Germany before the final blackout in Europe, bravery was not enough, for one act of violence against the tyrants would be paid for by other men, women, and children at unspeakable compound interest.

Even more distressing than the miseries he saw and heard about were the reports of the planned elimination of the American culture as such. The schools were closed. No word might be printed in English. There was a suggestion of a time, one generation away, when English would be an illiterate language, used orally alone by helpless peons who would never be able to revolt for sheer lack of a means of communication on any wide scale.

It was impossible to form any rational estimate of the numbers of Asiatics now in the United States. Transports, it was rumored, arrived daily on the West coast, bringing thousands of administrative civil servants, most of whom were veterans of the amalgamation of India. Whether or not they could be considered as augmenting the armed forces who had conquered and now policed the country it was difficult to say, but it was evident that they would replace the white minor offi-

cials who now assisted in civil administration at pistol point. When those white officials were "eliminated" it would be still more difficult to organize resistance.

THOMAS FOUND the means to enter the cities in one of the hobo jungles.

Finny—surname unknown—was not, properly speaking, a knight of the road, but one who had sought shelter among them and who paid his way by practicing his talent. He was an old anarchist comrade who had served his concept of freedom by engraving really quite excellent Federal Reserve notes without complying with the formality of obtaining permission from the treasury department. Some said that his name had been Phineas; others connected his monicker with his preference for manufacturing five-dollar bills—"big enough to be useful, not big enough to arouse suspicion."

He made a registration card for Thomas at the request of one of the 'bos. He talked while Thomas watched him work. "It's only the registration number that we really have to worry about, son. Practically none of the Asiatics you will run into can read English, so it really doesn't matter a lot what we say about you. 'Mary had a little lamb —' would probably do. Same for the photograph. To them, all white men look alike." He picked up a handful of assorted photographs from his kit and peered at them near-sightedly through thick spectacles. "Here—pick out one of these that looks not unlike you and we will use it. Now for the number—"

The old man's hands were shaky, almost palsied, yet they steadied down to a deft sureness as he transferred India ink to cardboard in amazing simulation of machine printing. And this he did without proper equipment, without precision tools, under primitive conditions. Thomas understood why the old artist's masterpieces caused headaches for bank clerks. "There!" he announced. "I've given you a serial number which states that you were registered shortly after the change, and a classification number which permits you to travel. It also says that you are physically unfit for manual labor, and are permitted to peddle or beg. It's the same thing to their minds."

"Thanks, awfully," said Thomas. "Now . . . uh . . . what do I owe you for this?"

Finny's reaction made him feel as if he had uttered some indecency. "Don't mention payment, my son! Money is wrong—it's the means whereby man enslaves his brother."

"I beg your pardon, sir," Thomas apologized sincerely. "Nevertheless, I wish there were some way for me to do something for you."

"That is another matter. Help your brother when you can, and help will come to you when you need it."

Thomas found the old anarchist's philosophy confused, confusing, and impractical, but he spent considerable time drawing him out, as he seemed to know more about tbe Pan-Asians than anyone else he had met. Finny seemed unafraid of them and completely confident of his own ability to cope with them when necessary. Of all the persons Thomas had met since the change, Finny seemed the least disturbed by it—in fact, disturbed not at all, and completely lacking in any emotion of hate or bitterness. This was hard for him to understand at first in a person as obviously warm-hearted as Finny, but he came to realize that, since the anarchist believed that all government was wrong and that all

men were to him *in fact* brothers, the difference to him was one of degree only. Looking at the Pan-Asians through Finny's eyes there was nothing to hate; they were simply more misguided souls whose excesses were deplorable.

Thomas did not see it from such Olympian detachment. The Pan-Asians were murdering and oppressing a once-free people. A good Pan-Asian was a dead Pan-Asian, he told himself, until the last one was driven back across the Pacific. If Asia was overpopulated, let them limit their birth rate.

Nevertheless, Finny's detachment and freedom from animus enabled Thomas more nearly to appreciate the nature of the problem. "Don't make the mistake of thinking of the Pan-Asians as *bad*—they're not—but they *are* different. Behind their arrogance is a racial inferiority complex, a mass paranoia, that makes it necessary for them to prove to themselves by proving to us that a yellow man is just as good as a white man, and a damned sight better. Remember that, son, they want the outward signs of respect more than they want anything else in the world."

"But why should they have an inferiority complex about the white man? We've been completely out of touch with them for more than two generations—ever since the Nonintercourse Act."

"Do you think racial memory is that short-lived? The seeds of this are way back in the nineteenth century. Do you recall that two high Japanese officials had to commit honorable suicide to wipe out a slight that was done Commodore Perry when he opened up Japan? Now those two deaths are being paid for by the deaths of thousands of white officials."

"But the Pan-Asians aren't Japanese."

"No, and they are not Chinese. They are a mixed race, strong, proud, and prolific. From the American standpoint they have the vices of both and the virtues of neither. But from my standpoint they are simply human beings who have been duped into the old fallacy of the State as a super-entity. *'Ich habe einen kameraden.'* Once you understand the nature of—" He went off into a long dissertation, a mixture of Rousseau, Rocker, Thoreau, and others. Thomas found it inspirational, but unconvincing.

On the strength of the forged registration card and Finny's coaching as to the etiquette of being a serf, Thomas ventured into a medium-sized city. The cleverness of Finny's work was put to test almost immediately.

He had stopped at a street corner to read a posted notice. It was a general order to all Americans to be present at a television receiver at eight each evening in order to note any instructions that their rulers might have for them. It was not news; the order had been in effect for some days and he had heard of it. He was about to turn away when he felt a sharp, stinging blow across his shoulder blades. He whirled around and found himself facing a Pan-Asian wearing the green uniform of a civil administrator, and carrying a swagger cane.

"Keep out of the way, boy!" He spoke in English, but in a light, singing tone which lacked the customary American accentuation.

Thomas jumped into the gutter—"They like to look down, not up"—and clasped his hands together in the form required. He ducked his head

and replied, "The master speaks; the servant obeys."

"That's better," acknowledged the Asiatic, apparently somewhat mollified. "Your ticket."

The man's accent was not bad, but Thomas did not comprehend immediately, possibly because the emotional impact of his first experience in the role of slave was all out of proportion to what he had expected. To say that he raged inwardly is meaninglessly inadequate.

The swagger cane cut across his face. "Your ticket!"

Thomas produced his registration card. The time the yellow man spent in examining it gave Thomas an opportunity to pull himself together to some extent. At the moment he did not care greatly whether the card passed muster or not; if it came to trouble, he would take this one apart with his bare hands.

But it passed. The Asiatic grudgingly handed it back and strutted away, unaware that death had brushed his elbow.

It turned out that there was little to be picked up in town that he had not already acquired secondhand in the hobo jungles. He had a chance to estimate for himself the proportion of rulers to ruled, and saw for himself that the schools were closed and the newspapers had vanished. He noted with interest that church services were still held, although any other gathering together of white men in assembly was strictly forbidden.

But it was the dead, wooden faces of the people, the quiet children, that got under his skin and made him decide to sleep in the jungles rather than in town.

THOMAS ran across an old friend at one of the hobo hide-outs. Frank Roosevelt Mitsui was as American as Will Rogers, and much more American than that English aristocrat, George Washington. His grandfather had brought his grandmother, half Chinese and half wahini, from Honolulu to Los Angeles, where he opened a nursery and continued to study *Bushido*, the ancient Japanese code of chivalry, while little yellow children grew up around him, children that knew neither Chinese nor Japanese, nor cared.

Frank's father met his mother, Thelma Wang, part Chinese but mostly Caucasian, at the International Club at the University of Southern California. He took her to the Imperial Valley and installed her on a nice ranch with a nice mortgage. By the time Frank was raised, so was the mortgage.

Jeff Thomas had cropped lettuce and honeydew melon for Frank Mitsui three seasons and knew him as a good boss. He had become almost intimate with his employer because of his liking for the swarm of brown kids that were Frank's most important crop. But the sight of a flat, yellow face in a hobo jungle made Thomas' hackles rise and almost interfered with him recognizing his old acquaintance.

It was an awkward meeting. Well as he knew Frank, Thomas was in no mood to trust an Oriental. It was Frank's eyes that convinced him; they held a tortured look that was even more intense than that found in the eyes of white men, a look that did not lessen even while he smiled and shook hands.

"Well, Frank," Jeff improvised inanely, "who 'u'd expect to find you here. I should think you 'u'd find it easy to get along with the new regime."

Frank Mitsui looked still more unhappy and seemed to be fumbling for words. One of the other hobos

cut in. "Don't be a fool, Jeff. Don't you *know* what they've done to people like Frank?"

"No, I don't."

"Well, you're on the dodge. If they catch you, it's the labor camp. So is Frank. But if they catch *him*, it's curtains—right now. They'll shoot him on sight."

"So? What did you do, Frank?"

Mitsui shook his head miserably.

"He didn't do anything," the other continued. "The empire has no use for American Asiatics. They're liquidating them."

It was quite simple. The Pacific coast Japanese, Chinese, and the like did not fit into the pattern of serfs and overlords—particularly the half-breeds. They were a danger to the stability of the pattern. With cold logic, they were being hunted down and killed.

Thomas listened to Frank's story. "When I got home they were dead—all of them. My little Shirley, Junior, Jimmy, the baby—and Alice." He put his face in his hands and wept. Alice was his wife. Thomas remembered her as a brown, stocky woman in overalls and straw hat, who talked very little but smiled a lot.

"At first I thought I would kill myself," Mitsui went on when he had sufficient control of himself, "then I knew better. I hid in an irrigation ditch for two days, and then I got away over the mountains. Then some whites almost killed me before I could convince them I was on their side."

Thomas could understand how that would happen, and could think of nothing to say. Frank was damned two ways; there was no hope for him. "What do you intend to do now, Frank?"

He saw a sudden return of the will to live in the man's face. "That is why I will not let myself die! Ten for each one"—he counted them off on his brown fingers—"ten of those devils for each one of my babies—and twenty for Alice. Then maybe ten more for myself, and I can die."

"Hm-m-m. Any luck?"

"Thirteen, so far. It is slow, for I have to be very sure, so that they won't kill me before I finish."

Thomas pondered it in his mind, trying to fit this new knowledge into his own purpose. Such fixed determination should be useful, if directed. But it was some hours later before he approached Mitsui again.

"How would you," he asked gently, "like to raise your quota from ten to a thousand each—two thousand for Alice?"

THE EXTERIOR alarms brought Ardmore to the portal long before Thomas whistled the tune that activated the door. Ardmore watched the door by reflectoscope from guard room, his thumb resting on a control, ready to burn out of existence any unexpected visitor. When he saw Thomas enter his thumb relaxed, but at the sight of his companion it tightened again. A Pan-Asian! He almost blasted them in sheer reflex before he checked himself. It was possible, barely possible, that Thomas had brought a prisoner to question.

"Major! Major Ardmore! It's Thomas."

"Stand where you are! Both of you."

"It's all right, major. He's an American. I vouch for him."

"Maybe." The voice that reached Thomas over the announcing phone was still grimly suspicious. "Just the same—peel off all of your clothes, both of you." They did so, Thomas biting his lip in humiliation, Mitsui trembling in agitation.

They used the epileptigenic ray on the penned prisoners till they no longer resembled anything human—

He did not understand it, and he felt trapped. "Now turn around slowly and let me look you over," the voice commanded.

Having satisfied himself that they were unarmed, Ardmore told them to stand still and wait, then called Graham on the intercommunication circuit. "Graham!"

"Yes, sir."

"Report to me at once in the guardroom."

"But, major, I can't. Dinner will be—"

"Never mind dinner! Move!"

"Yes, sir!"

Ardmore pointed out the situation to him in the reflectoscope. "You go down there and handcuff both of them from behind. Secure the Asiatic first. Make him back up to you, and watch yourself. If he tries to jump you, I may have to wing you, too."

"I don't like this, major," Graham protested. "Thomas is all right. He wouldn't be up to any hanky-panky."

"Sure, man, *I* know he's all right, too. But he may be drugged and under control. This set-up could be a Trojan Horse gag. Now get down and do as you are told."

While Graham was gingerly carrying out his unwelcome assignment—and making himself, in fact, eligible for a Congressional Medal which he would never receive, for his artist's imagination perceived too clearly the potential danger and forced him to call up courage for the task—Ardmore called up Brooks.

"Doctor, can you drop what you are doing?"

"Why, perhaps I can. Yes, I may say so. What is it you wish?"

"Then come to my office. Thomas is back. I want to know whether or not he is under the influence of drugs."

"But I am not a medical man—"

"I know that, but you are the nearest thing we've got to one."

"Very well, sir."

Dr. Brooks examined Thomas' pupils, tried his knee jerks, and checked his pulse and respiration. "I should say that he was perfectly normal, though exhausted and laboring under excitement. Naturally, this is not a positive diagnosis. If I had more time—"

"It will do for now. Thomas, I trust you won't hold it against me if we leave you locked up until we have examined your Asiatic pal."

"Certainly not, major," Thomas told him with a wry grin, "since you're going to, anyhow."

Frank Mitsui's flesh quivered and sweat dripped from his face when Brooks stuck the hypodermic into him, but he did not draw away. Presently he relaxed under the influence of the drug that releases inhibitions and strips from the speech centers the protection of cortical censorship. His face became peaceful.

But it was not peaceful a few minutes later when they began to question him, nor was there peace in any of their faces. This was truth, too raw and too brutal for any man to stand. Deep lines carved themselves from nose to jaw in Ardmore's face as he listened to the little man's pitiful story. No matter what line they started him on, he always came back to the scene of his dead children, his broken household. Finally Ardmore put a stop to it.

"Give him the antidote, doc. I can't stand any more of this. I've found out all I need to know."

Ardmore shook hands with him solemnly after he had returned to full awareness. "We are glad to have you with us, Mr. Mitsui. And we'll put you to some work that will give you a chance to get some of your own back. Right now I want Dr. Brooks to give you a soporific that will let you get about sixteen hours' sleep; then we can think about swearing you in and what kind of work you can be most useful doing."

"I don't need any sleep, Mister . . . Major."

"Just the same, you are going to get some. And so is Thomas, as

soon as he has reported. In fact—" He broke off and studied the apparently impassive face. "In fact, I want you to take a sleepy pill every night. Those are orders. You'll draw them from me and take them in my presence every night before you go to bed." There are certain bonus advantages to military absolutism. Ardmore could not tolerate the idea of the little yellow man lying awake and staring at the ceiling.

BROOKS AND GRAHAM would quite plainly have liked to stay and hear Thomas' report, but Ardmore refused to notice the evident fact and dismissed them. He wished first to evaluate the data himself.

"Well, lieutenant, I'm damn glad you're back."

"I'm glad to be back. Did you say 'lieutenant'? I assume that my rank reverts."

"Why should it? As a matter of fact, I am trying to figure out a plausible reason for commissioning Graham and Scheer. It would simplify things around here to eliminate social differences. But that is a side issue. Let's hear what you've done. I suppose you've come back with all our problems solved and tied up with string?"

"Not likely." Thomas grinned and relaxed.

"I didn't expect it. But seriously, between ourselves, I've got to pull something out of the hat, and it's got to be good. The scientific staff is beginning to crowd me, particularly Colonel Calhoun. There's no damn sense in them making miracles in the laboratory unless I can dope out some way to apply those miracles in strategy and tactics."

"Have they really gone so far?"

"You'd be surprised. They've taken that so-called 'Ledbetter effect' and shaken it the way a terrier shakes a rat. They can do anything with it but peel the potatoes and put out the cat."

"Really?"

"Really."

"What sort of things can they do?"

"Well—" Ardmore took a deep breath. "Honestly, I don't know where to begin. Wilkie has tried to keep me posted with simplified explanations, but, between ourselves, I didn't understand more than every other word. One way of putting it is to say that they've discovered atomic power—oh, I don't mean atom-splitting, or artificial radioactivity. Look—we speak of space, and time, and matter, don't we?"

"Yes. There's Einstein's space-time concept, of course."

"Of course. Space-time is standard stuff in high school these days. But these men really *mean* it. They really mean that space and time and mass and energy and radiation and gravity are all simply different ways of thinking about the *same thing*. And if you once catch on to how just one of them works, you have the key to all of them. According to Wilkie, physicists up to now were just fooling around the edges of the subject; they had the beginnings of a unified field theory, but they didn't really believe it themselves; they usually acted as if these were all as different as the names for them.

"Apparently Ledbetter hit on the real meaning of radiation, and that has given Calhoun and Wilkie the key to everything else in physics. Is that clear?" he added with a grin.

"Not very," Thomas admitted. "Can you give me some idea of what they can *do* with it?"

"Well, to begin with, the original Ledbetter effect—the thing that killed most of the personnel here—Wilkie calls an accidental side issue.

Brooks says that the basic radiation affected the colloidal dispersal of living tissue; those that were killed were coagulated by it. It might just as well have been set to release surface tension—in fact, they did that the other day, exploded a half a pound of beefsteak like so much dynamite."

"Huh?"

"Don't ask me how; I'm just repeating the explanation given me. But the point is, they seem to have found out what makes matter tick. They can explode it—sometimes—and use it for a source of power. They can transmute it into any element they want. They seem to be confident that they know what to do to find out how gravity works, so that they will be able to handle gravity the way we now handle electricity."

"I thought gravity was not considered a force in the modern concepts."

"So it isn't—but, then, 'force' isn't force, either, in unified field theory. Hell's bells, you've got me bogged down in language difficulties. Wilkie says that mathematics is the only available language for these ideas."

"Well, I guess I'll just have to get along without understanding it. But, frankly, I don't see how they managed to come so far so fast. That changes just about everything we thought we knew. Honestly, how is it that it took a hundred and fifty years to go from Newton to Edison, yet these boys can knock out results like that in a few weeks?"

"I don't know myself. The same point occurred to me, and I asked Calhoun about it. He informed me in that schoolmaster way of his that it was because those pioneers did not have the tensor calculus, vector analysis, and matrix algebra."

"Well, I wouldn't know," observed Thomas. "They don't teach that stuff in law school."

"Nor me," admitted Ardmore. "I tried looking over some of their work sheets. I can do simple algebra, and I've had some calculus, though I haven't used it for years, but I couldn't make sense out of this stuff. It looked like Sanskrit; most of the signs were different, and even the old ones didn't seem to mean the same things. Look—I thought that a times b always equaled b times a."

"Doesn't it?"

"Not when these boys get through kicking it around. But we are getting way off the subject. Bring me up to date."

"Yes, sir." Jeff Thomas talked steadily for a long time, trying very hard to paint a detailed picture of everything he had seen and heard and felt. Ardmore did not interrupt him except with questions intended to clarify points. There was a short silence when he had concluded. Finally Ardmore said:

"I think I must have had a subconscious belief that you would come back with some piece of information that would fall right into place and tell me what to do. But I don't see much hope in what you have told me. How to win back a country that is as completely paralyzed and as carefully guarded as you describe the United States to be is beyond me."

"Of course, I didn't see the whole country. About two hundred miles from here is as far as I got."

"Yes, but you got reports from the other hobos that covered the whole country, didn't you?"

"Yes."

"And it was all about the same. I think we can safely assume that what you heard, confirmed by what you saw, gives a fairly true picture.

How recent do you suppose was the dope you got by the grapevine telegraph?"

"Well—maybe three or four days old for news from the East coast—no more than that."

"That seems reasonable. News always travels by the fastest available route. It's certainly not very encouraging. And yet—" He paused and scowled in evident puzzlement. "And yet I have a feeling that you said something that was the key to the whole matter. I can't put my finger on it. I began to get an idea while you were talking, then some other point came up that diverted my mind, and I lost it."

"Maybe it would help if I started in again at the beginning," suggested Thomas.

"No need to. I'll play the recording back piece by piece sometime tomorrow, if I don't think of it in the meantime."

THEY were interrupted by peremptory knocking at the door. Ardmore called out, "Come in!" Colonel Calhoun entered.

"Major Ardmore, what's this about a Pan-Asiatic prisoner?"

"Not quite that, colonel, but we do have an Asiatic here now. He's American born."

Calhoun brushed aside the distinction. "Why wasn't I informed? I have notified you that I urgently require a man of Mongolian blood for test experimentation."

"Doctor, with the skeleton staff we have, it is difficult to comply with all the formalities of military etiquette. You were bound to learn of it in the ordinary course of events—in fact, it seems that you *were* informed in some fashion."

Calhoun snorted. "Through the casual gossip of subordinates!"

"I'm sorry, colonel, but it couldn't be helped. Just at the moment I am trying to receive Thomas' reconnaissance report."

"Very well, sir." Calhoun was icily formal. "Will you be good enough to have this Asiatic report to me at once?"

"I can't do that. He is asleep, drugged, and there is no way to produce him for you before tomorrow. Besides, while I am quite sure that he will be entirely co-operative in any useful experimentation, he is an American citizen and a civilian under our protection—not a prisoner. We'll have to take it up with him."

Calhoun left as abruptly as he had come. "Jeff," mused Ardmore, glancing after him, "speaking strictly off the record—oh, strictly!—if there ever comes a time when we are no longer bound down by military necessity, I'm going to paste that old beezer right in the puss!"

"Why don't you clamp down on him?"

"I can't, and he knows it. He's invaluable, indispensable. We've absolutely got to have his brains for research, and you can't conscript brains just by handing out orders. Y'know, though, in spite of his brilliance, I sometimes think he's just a little bit cracked."

"Shouldn't be surprised. What does he want Frank Mitsui so bad for?"

"Well, that's somewhat involved. They've proved that the original Ledbetter effect depends on some inherent characteristic of the life form it's applied to—I call it a natural frequency myself, though I understand that gives a false picture. They can tune it down to pick one man out of a group. Now Brooks has an idea, which Calhoun has worked up mathematically, that they can tune it to discriminate between races, knock over all the Asi-

atics in a group and not touch the white men, and vice versa."

"Whew! That *would* be a weapon."

"Yes, it would. It's just on paper so far, but they want to test it on Mitsui. As I gather what they intend to do, they don't exactly intend to kill him, but it's bound to be dangerous as all hell—to Mitsui."

"Frank won't mind chancing it," Thomas commented.

"No, I don't suppose he would." It seemed to Ardmore that it would probably be a favor to Mitsui to give him a clean, painless death in the laboratory. "Now about another matter. It seems to me we ought to be able to work up a sort of a permanent secret service, using your hobo pals and their sources of information. Let's talk about it."

ARDMORE gained a few days respite in which to consider further the problem of military use of the weapons at his disposal while the research staff tested their theories concerning the interrelation between racial types and the improved Ledbetter effect. The respite did him no good. He had a powerful weapon, yes; in fact, many powerful weapons, for it seemed that the new principles they had tapped had fully as protean possibilities as electricity. It seemed extremely likely that if the United States defense forces had had, one year earlier, the tools now available in the Citadel, the United States would never have fallen.

But six men cannot whip an empire—not by brute force. The emperor could, if necessary, expend six million men to defeat six. The hordes of the empire could come at them barehanded and win, move over them as an avalanche moves, until they were buried under a mountain of dead flesh. Ardmore had to have an army to fight with his wonderful new weapons.

The question was: How to recruit and train such an army?

Certain it was that the Pan-Asians would not hold still while he went into the highways and byways and got his forces together. The thoroughness with which they had organized police surveillance of the entire population made it evident that they were acutely aware of the danger of revolution and would stamp out any such activity before it could possibly reach proportions dangerous to them.

There remained one clandestine group, the hobos. He consulted with Thomas as to the possibility of organizing them for military purposes. Thomas shook his head at the idea.

"You can't understand the hobo temperament, chief. There is not one in a hundred that could be depended on to observe the strict self-discipline necessary for such an enterprise. Suppose you were able to arm all of them with projectors—I don't say that is possible, but suppose you could—you still would not have an army; you would simply have an undisciplined rabble."

"Wouldn't they fight?"

"Oh, sure, they 'u'd fight. They 'u'd fight as individuals, and they would do quite a bit of slaughter until some flatface caught them off guard and winged them."

"I wonder if we can depend on them as sources of information."

"That's another matter. Most of the road kids won't have any idea that they are being used to obtain military information. I'll handpick not over a dozen to act as reporters for me, and I won't tell them anything they don't have to know."

Any way he looked at it, simple, straightforward military use of the new weapons was not expedient.

Brutal frontal attack was for the commander who had men to expend. General U. S. Grant could afford to say, "I will fight it out on this line if it takes all summer," because he could lose three men to the enemy's one and still win. Those tactics were not for the commander who could not afford to lose *any* men. For him it must be deception, misdirection—feint and slash and run away, "—and live to fight another day!" The nursery rhyme finished itself in his mind. That was it. It had to be something totally unexpected, something that the Pan-Asians would not realize was warfare until they were overwhelmed by it.

It would have to be something like the "fifth columns" that destroyed the European democracies from within in the tragic days that led up to the final blackout of European civilization. But this would not be a fifth column of traitors, bent on paralyzing a free country, but the antithesis of that, a sixth column of patriots whose privilege it would be to destroy the morale of invaders, make them afraid, unsure of themselves.

And misdirection was the key to it, the art of fooling!

ARDMORE FELT a little better when he had reached that conclusion. It was something he could understand, a job suited to an advertising man. He had been trying to crack it as a military problem, but he was not a field marshal and it had been silly of him to try to make a noise like one. His mind did not work that way. This was primarily a job in publicity, a matter of mob psychology. A former boss of his, under whom he had learned the racket, used to tell him, "I can sell dead cats to the board of health with a proper budget and a free hand."

Well, he had a free hand, all right, and the budget was no problem. Of course, he could not use the newspapers and the old channels of advertising, but there would be a way. The problem now was to figure out the weak points of the Pan-Asians and decide how Calhoun's little gadgets could be used to play on those weak points until the Pan-Asians were sick of the whole deal and anxious to go home.

He did not have a plan yet. When a man is at a loss for a course of action, he usually calls a conference. Ardmore did.

He sketched out to them the situation up to date, including all that Thomas had learned and all that had come in by television through the conquerors' "educational" broadcasts. Then he discussed the powers that were made available to them by the research staff, and the various obvious ways in which they could be applied as military weapons, emphasizing the personnel necessary to use each type of weapon effectively. Having done so, he asked for suggestions.

"Do I understand, major," Calhoun began, "that after rather pointedly telling us that you would make all military decisions you are now asking us to make up your mind for you?"

"Not at all, colonel. I have still the responsibility for any decision, but this is a new sort of military situation. A suggestion from any source may prove valuable. I don't flatter myself that I have a monopoly on common sense, nor on originality. I would like for every one of us to tackle this problem and let the others criticize it."

"Do you yourself have any plan to offer us?"

"I am reserving my opinions until the rest of you have spoken."

"Very well, sir"—Dr. Calhoun straightened himself up—"since you have asked for it, I will tell you what I think should be done in this situation—what, in fact, is the only thing that can be done.

"You are aware of the tremendous power of the forces I have made available." Ardmore noticed Wilkie's mouth tighten at this allocation of credit, but neither of them interrupted. "In your resumé, you underestimated them, if anything. We have a dozen fast scout cars housed here in the Citadel. By refitting them with power units of the Calhoun type, they can be made faster than anything the enemy can put into the air. We will mount on them the heaviest projectors and attack. With overwhelmingly superior weapons, it is only a matter of time until we will have the Pan-Asiatic empire beaten to its knees!"

Ardmore wondered how any man could be so blind. He did not himself wish to argue against Calhoun; he said, "Thank you, colonel. I'll ask you to submit that plan written up in more detail. In the meantime, does anyone wish to amplify or criticize the colonel's suggestion?" He waited hopefully, then added, "Come now, no plan is perfect. You must have some details to add, at least."

Graham took the plunge. "How often do you expect to come down to eat?"

Calhoun cut in before Ardmore could call on him. "Well, I'm damned! I must say that I consider this no time for facetiousness."

"Wait a minute," protested Graham, "I didn't mean to be funny. I'm quite serious. That's my department. Those scout cars are not equipped to keep the air very long, and it seems to me that it will take quite a long time to reconquer the United States with a dozen scout cars, even if we located enough men to keep them in the air all the time. That means you have to come back to base to eat."

"Yes, and that means the base will have to be held against attack," Scheer put in suddenly.

"The base can be defended with other projectors." Calhoun's tone was scornful. "Major, I really must ask that the discussion be confined to sensible issues."

Ardmore rubbed his chin and said nothing.

Randall Brooks, who had been listening thoughtfully, pulled a piece of paper out of his pocket and began to sketch. "I think Scheer has something, Dr. Calhoun. If you will look here for a moment—here, at this point, is your base. The Pan-Asians can encircle the base with ships at a distance greater than the range of the base projectors. The greater speed of your scout cars will be unimportant, for the enemy can well afford to use as many ships as necessary to insure our craft not getting past the blockade. It's true that the scout cars will have the projectors with which to fight, but they can't fight a hundred ships at once, and the enemies' weapons are powerful, *too*—we mustn't forget that."

"You're right they're powerful!" added Wilkie. "We can't afford to have a known base. With their bombardment rockets they could stand back a thousand miles and blow this whole mountain out of the ground, layer by layer, *if* they knew we were under it."

Calhoun stood up. "I am not going to remain here and listen to misgivings of pusillanimous fools. My plan assumed that *men* would execute it." He walked stiffly out the room.

ARDMORE IGNORED his departure and went hurriedly on, "The objections made to Colonel Calhoun's scheme seem to me to apply to every plan for open, direct combat at this time. I have considered several and rejected them for approximately those reasons, at least for reasons of logistics—that is to say, the problem of military supply. However, I may not have thought of some perfectly feasible solution. Does anyone have a direct warfare method to suggest, a method which will not risk personnel?"

No one answered. "Very well. Bring it up later if you think of one. It seems to me that we must necessarily work by misdirection. If we can't fight the enemy directly *at this time*, we must fool 'em until we can."

"I see," agreed Dr. Brooks, "the bull wears himself out on the cape and never sees the sword."

"Exactly. Exactly. I only wish it were as easy as that. Now do any of you have any ideas as to how we can use what we've got without letting them know who we are, where we are, or how many we are? And now I'm going to take time out for a cigarette while you think about it."

Presently he added, "You might bear in mind that we have two real advantages: The enemy apparently has not the slightest idea that we even exist, and our weapons are strange to them, even mysterious. Wilkie, didn't you compare the Ledbetter effect to magic?"

"I should hope to shout, chief! It's safe to say that, aside from the instruments in our laboratories, there just isn't any way in existence to detect the forces we are working with now. You don't even know they're *there*. It's like trying to hear radio with your bare ears."

"That's what I mean. Mysterious. Like the Indians when they first met up with the white man's firearms, they died and they didn't know why. Think about it. I'll shut up and let you."

Graham produced the first suggestion. "Major?"

"Yes?"

"Why couldn't we kidnap 'em?"

"How do you mean?"

"Well, your idea is to throw a scare into 'em, isn't it? How about a surprise raiding party, using the Ledbetter effect. We could go in one of the scout cars at night and pick out some really big shot, maybe the prince royal himself. We knock out everybody we come in contact with with the projectors, and we walk right in and snatch him."

"Any opinions about that, gentlemen?" Ardmore said, reserving his own.

"It seems to have something to it," commented Brooks. "I would suggest that the projectors be set to render unconscious for a number of hours rather than to kill. It seems to me that the psychological effect would be heightened if they simply awoke and found their big man gone. One has no recollection of what has happened under such circumstances, as Wilkie and Mitsui can testify."

"Why stop at the prince royal?" Wilkie wanted to know. "We could set up four raiding parties, two to a car, and make maybe twelve raids in a single night. That way we could knock over enough of their number-one men to really cause some disorganization."

"That seems like a good idea," Ardmore agreed. "We may not be able to pull off these raids more than once. If we could do enough damage right at the top in one blow, we might both demoralize them and set off a general uprising. What's the matter, Mitsui?"

He had noticed the Oriental look-

ing unhappy as the plan was developed. Mitsui spoke reluctantly, "It will not work, I am afraid."

"You mean we can't kidnap them that way? Do you know something we don't about their guard methods?"

"No, no. With a force that reaches through walls and knocks a man down before he knows you are there I believe you can capture them, all right. But the results will not be as you foresee them."

"Why not?"

"Because you will gain no advantage. They will not assume that you are holding their chief men as prisoners; they will assume that each one has committed suicide. The results will be horrible."

It was purely a psychological point, with room for difference of opinion. But the white men could not believe that the Pan-Asians would dare to retaliate if it were made unmistakably plain to them that their sacred leaders were not dead, but at the mercy of captors. Besides, it was a plan that offered immediate action, which they were spoiling for. Ardmore finally agreed to its adoption for want of something better, although he had a feeling of misgiving which he suppressed.

For the next few days all effort was bent toward preparing the scout cars for the projected task. Scheer performed Herculean mechanical jobs, working eighteen and twenty hours a day, with the others working joyfully under his supervision. Calhoun even came off his high horse and agreed to take part in the raid, although he did not help with the "menial" work. Thomas went out on a quick scouting trip and made certain of the location of twelve well-scattered Pan-Asian seats of government.

In the buoyancy of spirit which resulted from a plan of campaign, *any* plan of campaign, Ardmore failed to remember his own decision that what was required was a sixth column, an underground, or at least, unsuspected organization which would demoralize the enemy from within. This present plan was not such a one, but an essentially military plan. He began to think of himself as, if not Napoleon, at least as a modern Swamp Rat, or Sandino, striking through the night at the professional soldiers and fading away.

But Mitsui was right.

The television receiver was used regularly, with full recording, to pick up anything that the overlords had to broadcast to their slaves. It had become something of a custom to meet in the common room at eight in the evening to listen to the regular broadcast in which new orders were announced to the population. Ardmore encouraged it; the "hate session" it inspired was, he believed, good for morale.

Two nights before the projected raid they were gathered as usual. The ugly, broad face of the usual propaganda artist was quickly replaced by another and older Pan-Asian whom he introduced as the "heavenly custodian of peace and order." The older man came quickly to the point. The American servants of a provincial governor had committed the hideous sin of rebelling against their wise rulers and had captured the sacred person of the governor and held him prisoner in his own palace. The soldiers of the heavenly emperor had brushed aside the insane profaners in the course of which the governor had most regrettably gone to his ancestors.

A period of mourning was announced, commencing at once, which would be inaugurated by permitting

the people of the province to expiate the sins of their cousins. The television scene cut from the room from which he spoke.

It came to rest on great masses of humanity, men, women, children, huddled, jammed, behind barbed wire. The pick-up came down close enough to permit the personnel of the Citadel to see the blind misery on the faces of the crowd, the wept-out children, the mothers carrying babies, the helpless fathers.

They did not have to watch those faces long. The pick-up panned over the packed mob, acre on acre of helpless human animals, then returned to a steady close-up of one section.

They used the epileptigenic ray on them. Now they no longer resembled anything human. It was, instead, as if tens of thousands of monstrous chickens had had their necks wrung all at once and had been thrown into the same pen to jerk out their death spasms. Bodies bounded into the air in bone-breaking, spine-smashing fits. Mothers threw their infants from them, or crushed them in uncontrollable, viselike squeeze.

The scene cut back to the placid face of the Asiatic dignitary. He announced with what seemed to be regret in his voice that penance for sins was not sufficient, it was necessary also to be educational, in this case to the extent of one in every thousand. Ardmore did a quick calculation in his head. A hundred and fifty thousand people! It was unbelievable.

But it was soon believed. The pick-up cut again, this time to a residential street in an American city. It followed a squad af Pan-Asian soldiers into the living room of a family. They were gathered about a television receiver, plainly stunned by what they had just seen. The mother was huddling a young girl-child to her shoulder, trying to quiet her hysteria. They seemed stupefied, rather than frightened, when the soldiers burst into their home. The father produced his card without argument; the squad leader compared it with a list, and the soldiers attended to him.

They had evidently been instructed to use a method of killing that was not pretty.

Ardmore shut off the receiver. "The raid is off," he announced. "Go to bed, all of you. And each of you take a sleeping pill tonight. That's an order!"

They left at once. No one said anything. After they were gone, Ardmore turned the receiver back on and watched it through to the end. Then he sat alone for a long time, trying to get his thoughts back into coherence. Those who order sleeping drafts won't take them.

ARDMORE KEPT very much to himself for the next two days, taking his meals in his quarters, and refusing anything but the briefest of interviews. He saw his error plainly enough now; it was small solace to him that it had been another's mistake which had resulted in the massacre—he felt symbolically guilty.

But the problem remained with him. He knew now that he had been right when he had decided on a sixth column. A sixth column! Something which would conform in every superficial way to the pattern set up by the rulers, yet which would have in it the means of their eventual downfall. It might take years, but there must be no repetition of the ghastly mistake of direct action.

He knew intuitively that somewhere in Thomas' report was the idea he needed. He played it back again and again, but still he couldn't get it, even though he now knew it

by heart. "They are systematically stamping out everything that is typically American in the culture. The schools are gone, so are the newspapers. It is a capital offense to print anything in English. They have announced the early establishment of a system of translators for all business correspondence into their language; in the meantime all mail must be approved as necessary. All meetings are forbidden, except religious meetings."

"I suppose that is a result of their experience in India. Keeps the slaves quiet." That was his own voice, sounding strange in reproduction.

"I suppose so, sir. Isn't it an historical fact that all successful empires have tolerated the local religions, no matter what else they suppressed?"

"I suppose so. Go ahead."

"The real strength of their system, I believe, is in their method of registration. They apparently were all set to put it into force, and pressed forward on that to the exclusion of other matters. It's turned the United States into one big prison camp in which it is almost impossible to move or communicate without permission from the jailers."

Words, words, and more words! He had played them over so many times that the significance was almost lost. Perhaps there was nothing in the report, after all—nothing but his imagination.

He responded to a knock at the door. It was Thomas. "They asked me to speak to you, sir," he said diffidently.

"What about?"

"Well—they are all gathered in the common room. They'd like to talk with you."

Another conference—and not of his choosing, this time. Well, he would have to go. "Tell them I will be in shortly."

"Yes, sir."

After Thomas had gone, he sat for a moment, then went to a drawer and took out his service side arm. He could smell mutiny in the very fact that someone had dared to call a general meeting without his permission. He buckled it on, then tried the slide and the charge, and stood looking at it. Presently he unbuckled it and put it back into the drawer. It wouldn't help him in this mess.

He entered, sat down in his chair at the head of the table, and waited. "Well?"

BROOKS glanced around to see if anyone else wished to answer, cleared his throat, and said, "Uh—We wanted to ask you if you had any plan for us to follow."

"I do not have—as yet."

"Then we do have!" It was Calhoun.

"Yes, colonel?"

"There is no sense in hanging around here with our hands tied. We have the strongest weapons the world has ever seen, but they need men to operate them."

"Well?"

"We are going to evacuate and go to South America! There we can find a government which will be interested in superior weapons."

"What good will that do the United States?"

"It's obvious. The empire undoubtedly intends to extend its sway over this entire hemisphere. We can interest them in a preventative war. Or perhaps we can raise up an army of refugees."

"No!"

"I am afraid you can't help yourself, major." The tone held malicious satisfaction.

He turned to Thomas. "Are you with them on this?"

Thomas looked unhappy. "I had hoped that you would have a better plan, sir."

"And you, Dr. Brooks?"

"Well—it seems feasible. I feel much as Thomas does."

"Graham?"

The man gave him answer by silence. Wilkie looked up and then away again.

"Mitsui?"

"I'll go back outside, sir. I have things to finish."

"Scheer?"

Scheer's jaw muscles quivered. "I'll stick if you do, sir."

"Thanks." He turned to the rest. "I said, 'No!' and I mean it. If any of you leave here, it will be in direct violation of your oaths. That goes for you, Thomas! I'm not being arbitrary about this. The thing you propose to do is on all fours with the raid I canceled. So long as the people of the United States are hostages at the mercy of the Pan-Asians we can*not* take direct military action! It doesn't make any difference whether the attack comes from inside or outside, thousands, maybe millions, of innocent people will pay for it with their lives!"

He was very much wrought up, but not too much so to look around and see what effect his words were having. He had them back—or would have them in a few minutes. All but Calhoun. They were looking disturbed.

"Supposing you are right, sir"—it was Brooks, speaking very gravely—"supposing you are right, is there anything we *can* do?"

"I explained that once before. We have to form what I called a 'sixth column,' lie low, study out their weak points, and work on them."

"I see. Perhaps you are right. Perhaps it is necessary. But it calls for a sort of patience more suited to gods than to men."

He almost had it then. What was it?

"I was never much of a churchgoer," Wilkie said inanely.

That was it! That was it!

"You're right," he said to Brooks. "Have you listened to Thomas' report?"

"I listened to the play-back."

"Do you recall the one respect in which white men are still permitted to organize?"

"Why, no, I don't recall that there was one."

"None? Nowhere that they were permitted to assemble?"

"I know!" Thomas burst in. "Churches!"

Ardmore waited a moment for it to sink in, then he said very softly, "Has it ever occurred to any of you the possibilities that might lie *in founding a new religion?*"

There was a short and startled silence. Calhoun broke it.

"The man's gone mad!"

TO BE CONTINUED.

THE DAY WE CELEBRATE

By Nelson S. Bond

Everybody agreed it was a day to celebrate, but there was a slight confusion as to why, how, and for what reason—

Illustrated by Eron

It had snowed yesterday and the day before. It was snowing now. It would snow again tomorrow and the next day.

"—and the day after that," said Baldy Harrigan, warden of Penal Colony No. 1, Uranus, "and the day after that, and the day after *that!* And so on. *Ad infinooty.*"

He turned disgustedly from the quartzite view pane. There was nothing to see outside there but rolling dunes of frozen carbon dioxide, rime-crusted hills of raw metal, and a tempest of white granules sifting endlessly out of a dull and sullen sky.

Beside him, his companion, Rusty Peters—once an inmate of P. C. 1, then a trusty, now, by choice, Baldy's chief assistant—crammed another fistful of scrap into an already bulging jowl.

"Odd which?"

"*Infinooty,*" repeated Harrigan. "That's Latin for, 'till it gives you the screaming meemies.' Don't it never do nothing but snow on this here lousy planet?"

"Sometimes," consoled Rusty, "it sleets. Gee, what the hell, Baldy! We ain't got no squawk. It's safe an' warm here in the dome, anyway. S'posin' we lived in caverns, like the natives? They've *really* got it tough."

Baldy Harrigan's space-faded eyes crackled.

"The tougher," he snarled, "the better! Them green scuts give me a headache in the sitting-down place. We could be hearing music and seeing pictures from New Oslo except for them. Something to pass the time away.

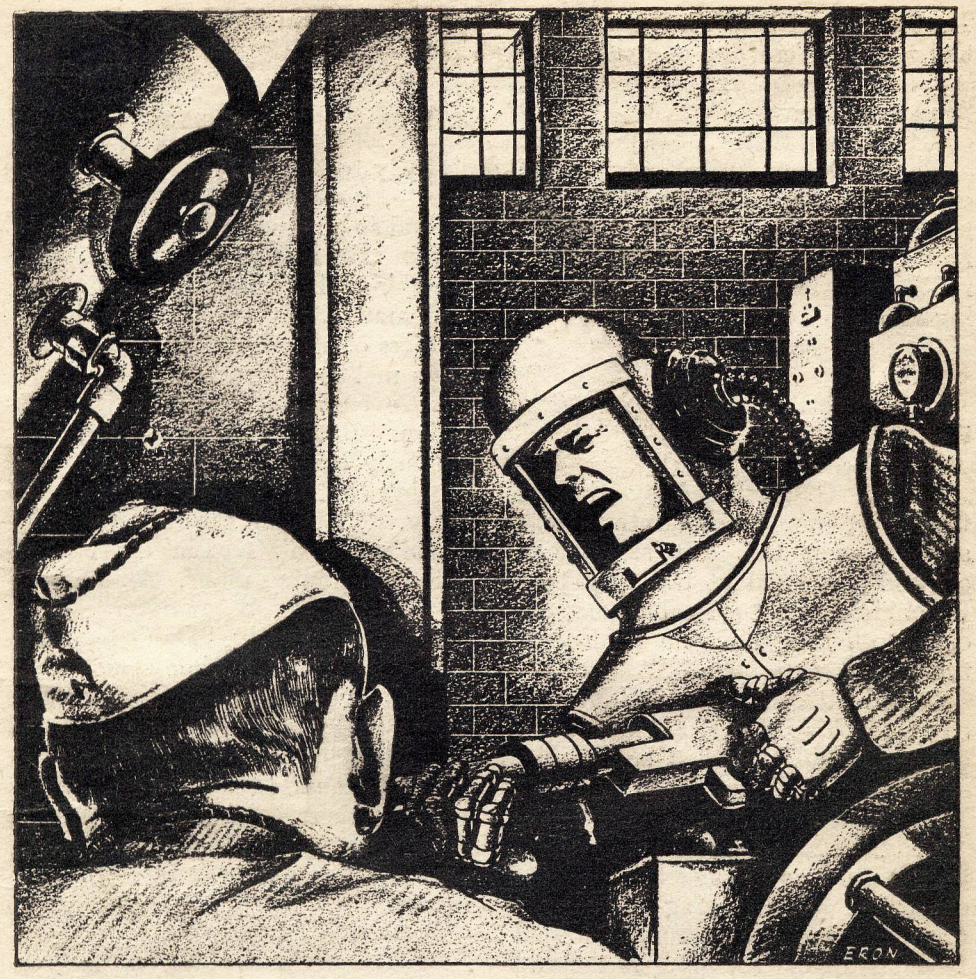
"But, no! They pick a season like this to smash up our outside aërials. Which means that all we get in the line of entertainment is coded weather reports and flight transfer orders.

"Just wait! The first clear spell comes along, I'm going to take out an expedition and give them deadpans what-for! Somebody ought to 'a' done it long ago, anyhow—"

"Don't look now," said Rusty, "but it's been tried. Not once or twice, but about six million times. The Patrol's been warrin' on the Uranians ever since the first flight ship dropped gravs here. So what? So they still ain't managed to squelch 'em. The natives is still makin' periodic attacks on the Earth colonies.

"For which," he added pensively, "I don't know as I blame 'em much. After all, Uranus *was* their planet. Till we come along. An' the Patrol ain't exactly what you might call no debatin' team. Its missionary method is *bang-bang!* with a rotor gun, an' you're civilized. R. I. P."

"The Solar Space Patrol—" began Harrigan stiffly.



They hustled in with weapons at the ready—rescue on the way! And stopped blankly at the scene of supposed carnage—

"Yeah, I know. It brang order out o' chaos. Or so the buttons on the unyform say. Nuts, Baldy! The Rocketeers ain't no diff'rent from any other bunch of conquerors. They do just what England done in India, Holland done in the Pacific, an' the States done in the Philippines. 'Underneath the starry flag, civilize 'em with a Krag'—an' so on!"

Rusty grunted, scanned the metal-walled antechamber hopefully with his eyes, and dropped a quivering arc of brown liquid dead-center into a distant gobboon.

"Nevertheless—" said Baldy.

"The Uranians *are* pests," admitted Rusty. "They git in our hair. They raid our outposts an' bust up our vallybul equipment an' when they can git gunpowder—which ain't often—they even attack domed cities like New Oslo.

"But why do we hafta be so rough with 'em? Why not call a big conference an' parley our diff'rences?

That would be better'n formin' parties to blast 'em out of existence."

"Nevertheless," repeated Baldy, "and howsomever—"

"Hey!" said Rusty. "What's up?"

The intercommunicating visiplate on the far wall of the chamber had brightened. The face of Tommy Henderson, the Penal Colony's radioman, was imaged on the gleaming platter.

"Warden Harrigan?"

"Yes."

"An important message from Patrol H. Q."

"Go ahead."

"It's a G. O. signed by Colonel Cochrane, commanding Interplanetary Division 134. It says, 'The governing council of the Planetary Union, in congress assembled, has decided to finally achieve a solution of the Uranium problem—' "

"Hold it!" snapped Baldy. He stared at his copper-thatched associate. "I and you must be psychic! Just what we was talking about. We'll be right there, Sparks!"

This last was over his shoulder to the visiplate as he tugged at Baldy's elbow, his walk breaking into a waddling run. The radioman's puzzled face faded from the plate as the two men hurried through the dome to the communications room.

THERE, a few moments later, they saw the message in its entirety. It was, as Sparks had said, from the commander of the New Oslo garrison.

" 'The governing council of the Planetary Union,' it ran, 'in congress assembled, has decided to finally achieve a solution of the Uranian problem.

" 'This is to be done immediately, in order that the date of accomplishment may coincide with the date of tomorrow—a holiday observed and respected by all Earthmen.

" 'The present order supersedes all former orders or combat plans. Upon receiving this message, the commanders of all outposts will rendezvous instantly to this base for more, and definite, instructions—'

"And so on, and so on," concluded Baldy. He looked at Peters with something like awe in his eyes. "Commanders!" he said. "Commanders of all outposts! Hey . . . that's me!"

But even more dazed was his companion. Rusty's jaw had dropped perilously agape.

"Ain't that a whipper!" whispered Rusty. " 'Achieve a solution o' the 'Ranie problem'. Kickin' overboard all the old combat plans. An' all because of a date. *What* date?"

Baldy said curtly, "Don't look at me. I lost track of time something like nine years ago. Who gives a damn what *Earth* date it is on a planet which takes eighty-four years to swing around the Sun? The main thing is, there's going to be something done. At last. And me, I'm in on it. I've got to get to— Hey, Sparks!"

"Yessir?"

"Get Hogan in the lock room. Tell him to get me out a bulger, check and fuel a motosled, and call a driver. I've got to get to New Oslo, and fast!"

"Yessir!"

Rusty said, "Look, Baldy—when we get there, tell 'em like I just been sayin', huh? About bein' kind o' gentle with the 'Ranies, remember? Honest, I think that's the smart way to—"

"To find out," snorted Harrigan, "which is hottest, Hades or Mercury! I'll tell them nothing, Rusty. The Patrol knows what it's doing. Now, look—you're in command of this dump while I'm away. Do a good

job of it, and I'll enter you for a credit boost next period. Keep the men working on them wore-out drain pipes, and see that Slops don't make soup with the dishwater.

"And put the stiff on that big soft heart of yours! Lapsley and Youst are supposed to be serving punishment hours in sol; don't go throwing no pink teas or parties for them—understand?"

"Aw, Baldy—"

"Are you going to do like I say? Or—"

"Sure, Baldy. Only, gosh—"

"All right, then. Sparks, get the lock room. Well, Hogan, that you? Got that stuff ready? O. K. I'll be right there. O. K.!"

He shoved a beefy paw in Peters' direction.

"Carry on, fella. Be seeing you!"

Then he was gone.

THROUGH the radio-room wall plate, Rusty watched his friend's motosled nose from the ground lock, swing in a great circle to catch the guide beam, and scud eastward over frost-silvered terrain. The incessant snow was like a great, thick veil, first dimming the outlines of the sturdy skier, the one type of mobile unit practical on Uranus' frozen bosom, then hiding its form entirely. When solid white had obliterated even the tiny red dot of the exhaust, Rusty turned, a still-unanswered question in his eyes.

"I don't get it, Sparks. I don't get it nohow! It don't make sense for the Patrol to issue such an order unless they— Look, you know what day tomorrow is, don't you, maybe?"

The radioman looked helplessly at his audio banks.

"Tuesday?" he hazarded.

"I *know* it's Tuesday," said Rusty. "I mean—what day of what month? Earth figgerin'?"

"Well, it's like this, Rusty. I've been out here a long time. We don't have much contact with the Outside, you know. And I tried to keep a diary for a while, but, well you know how it is. The days sort of slip by, and—"

"In other words," complained Rusty, "you don't know. When I got you for a helper, a huluva git I got! It must be some day special to make the Patrol decide—"

Again his eyes sought the quartzite view pane. And then, suddenly, he gasped. Gasped and chortled, a great roar of glee bursting from his lips.

"*Of course!*"

"Huh?" said the startled Sparks.

"Why, sure! Now I know. Sparks, I'm ashamed o' myself! Of all of us. We musta left our finer instincts behind us when we left Earth!" His eyes sparkled with excitement and swift decision. "Sparks, hop the ditty! Audio the workshops, the labs, the rec rooms. I want every man under the dome to be in the auditorium in five minutes flat!"

The radioman looked at him dubiously. "But Harrigan said—"

"Harrigan said I was in command, didn't he? Now are you gonna do like I say, or—" Almost as an afterthought he offered the alternative—"or do I have to yank off your head an' shove it down your throat?"

Sparks said, "I'm doing it, Mr. Peters," and got to work on the plugs. Rusty rubbed freckled hands together. He had swallowed his chaw some time ago. He would discover that fact later, to his great embarrassment. But right now he was beaming with delight and enthusiasm.

"Ever since they made me assistant warden here," he gloated, "I been tryin' to tell the Earth authori-

ties that we ain't no ordinary prison, here at P. C. 1. It's punishment enough for the men to be eighteen hundred million miles from home, without they should also be treated like scum.

"Baldy an' me managed to convince Inspector Wegland of that, the time he cracked up on the steppes. But now we've got a chance to prove to the whole damn Universe that, cons or no cons, the inmates of this jug is human bein's. Complete with feelin's an' *ee*-motions.

"Sparks—where was the nearest native hide-out, last time you heard?"

"Not far from here. Scar Mountains. A half-hour's run."

"That's what I thought. So we're lots nearer the 'Ranies than the Patrol is. Which makes my ideer a lallapaloozy. Now, look, Sparks. Here's what we're gonna do—"

COLONEL COCHRANE of the S. S. P., grim, gray, glorious with medals betokening his valor in a half hundred segments of the Universe, stopped talking and studied the faces of the men who had come to New Oslo in response to his summons.

"Are there any questions, gentlemen?"

Warden Pat Harrigan coughed nervously. He rated as a captain, but he was fully aware that his was only a semimilitary rating. He smoothed a sweating palm over his barren pate.

"Ain't this—" he began, and stopped, flushing, to begin over again. "*Isn't* this a sort of ruthless way to work on the 'Ranies, colonel? After all, like one of the guys in my outfit—my assistant, Rusty Peters—said, Uranus used to be their planet. Till we come here. Maybe we ought to be gentle with them. Negotiate, or—"

Cochrane frowned, and a half dozen of his underling officers obediently masked their faces with disapproval.

"Negotiation has proven fruitless, warden. The Uranian natives are a sullen, dangerous, treacherous lot. It is our task to put an end to their periodic uprisings. Force is indicated; force concluding in utter annihilation should they show resistance."

"But if you want peace—"

"That is exactly what we want. But since they will not sign a peace pact, we will adopt the more stringent means of ending hostilities." Cochrane's chest lifted. "And it is altogether fitting and appropriate that tomorrow should bring Uranus into the family of solar children. A date revered by all Earthmen, hallowed in our annals, celebrated by Earthmen the Universe over—"

There it was again. Baldy said, "Oh, yeah. That's right. Tomorrow's the . . . er . . . er—"

"The nineteenth of November!" said Colonel Cochrane proudly. "The day we celebrate. Empire Day!"

"Hell!" muttered Harrigan under his breath. "Sure! Empire Day!"

He should have guessed it. He should have remembered the moment he saw the message calling him to this meeting. The nineteenth of November was the anniversary of the day on which, some seventy-odd years ago, Earth's military might had brought about the armistice and eventual peace that welded into a solid empire the four inner planets.

Not without reason was it Earth's greatest holiday. It had taken thirty long years, and millions of lives, and an unguessable wealth in craft and arms to bring about the union now governed so placidly from Earth. The Rollie Rebellion on Mercury, the

Fontanaland uprising on Mars, the Twelve Years' Siege of Venus City—all of these had come to a peaceful ending on November 19, 2238 A. D.

That day, too, had ushered in a new era. An era of further exploration. Earth's factories, able at long last to cease wholesale production of armaments, had delved into the problem of perfecting spacecraft. From their researches had come such things as the Wittenberg converter, the Holloway vacuum feed chambers, the anatherms—and the frontiers once more began to roll back before man's onslaught of knowledge.

Where once the planetoids had been a chaotic network of unplumbed mystery, frequented only by space scavengers and occasional pirate hordes, now it was a huge, charted, floating ore deposit for the entire Solar System. Jupiter had not been—nor could it be for countless centuries—conquered, but two of its satellites now gave refuge to Earthling colonists. In the outer rings of Saturn worked space placers, gathering to Earth's wealth the valuable shards of what had once been two satellites. Uranus boasted its tiny colonies; Neptune was now being studied for a colonization project. And far Pluto was under constant electrono-mirror bombardment that its icy surface might some day be cleared.

Empire Day! "The day," thought Baldy, "the day we celebrate." With a swift, devastating nostalgia he remembered his boyhood on Earth. The public gatherings in vast, buttressed auditoriums, the political speeches, the flag-waving, the firecrackers and sandwiches and drinks; the parade of veterans, the evening spectacle of mock warfare in the vaulted lofts of Earth's soft, blue skies—

Empire Day!

Colonel Cochrane was talking again.

"—more than fitting that this day, symbolic of our great victories in the the past, should also be the day on which we add Uranus to our list of permanent colonies.

"And now, gentlemen, to the specific problem. Our scouts inform me that the headquarters of the Uranian native chief, Ras Tirl, lies in the caverns of the Scar Mountains. There we shall take our punitive expedition. Captain Mancum, you will lead Company A; Captain Larey, Company B—"

Baldy said, "Pardon, sir—you said Scar Mountains? That's right near P. C. 1."

"Yes, warden. That is why you were summoned to the staff conference. We will use the Colony as our base, in the unlikely event that our aims cannot be completed in one day. You will, therefore, send a message to your next-in-command, ordering him to arrange food and quarters for us."

"Yes, sir!" said Baldy.

RUSTY PETERS looked with satisfaction upon the huge auditorium of P. C. 1. He had, he thought, done pretty darned well in so short a time. Four hours ago this had been just a meeting place. Now it bristled with equipment for the action to take place.

He said, "Hm-m-m!" and rubbed his hands together. He said, "Well, that's that! Slops, everything ready in the culin . . . the cuul . . . the kitchen?"

The Colony cook nodded surlily. "Yeah. But if you ask me—"

"I ain't askin' you," said Rusty. And added piously, "An army travels on its stummick."

"So does a worm," commented Slops.

"O. K. An' worms win in the end, don't they? Now, Johnson, Bridges, Howe—you all set?"

The three bulger-clad convicts nodded. Each bore a Traimers-Lincoln heat gun. Johnson, the appointed leader of the trio, said, "We sled to their hide-out, kick up a fuss, get 'em coming after us. And retreat slowly to the Colony."

"Right," said Rusty.

"Suppose they don't follow us?"

"Suppose Mercury has a snowstorm!" snorted Peters. "They'll folly you. Them 'Ranies has their faults, but they are the fightin'est fools I ever seen. They'd stalk a human from hell to Hercules. Which is what ye're bankin' on. Because when they git here"—again he stared about him with tight satisfaction—"they bump into *this!*"

Johnson looked dubious.

"I don't know, Rusty. It's tricky business."

"Tomorrow," Rusty told him succinctly, "is the day we celebrate. Fust, because it's a holiday; second, because we're gonna make the Rocketeers look like monkeys. Now, git goin'!"

They got.

It was scant seconds later that Sparks brought him the message from Baldy, ordering him to have everything ready for the feeding and quartering of three mechanized Rocketeer units. And Rusty grinned.

"They," he opined, "got a su'prise comin'. By the time they git here, the squabblin' will be over. But we got to work fast!"

DULL, white monotony, endless and unbroken, coursed beneath the runners of the motosled in which he rode. Baldy looked at the chronometer on his wrist. Nine hours. Almost there. Shortly, through the white veil that shredded itself interminably against the foreshield, should appear the hoary crest of the Scar Mountains.

It did. Sallow sunlight glinted feebly on towering crags that, through aeons of time, had never known the green mantle of vegetation. Around the topmost peak fingered pink and angry streamers of cold fire. An ionic storm in the upper atmosphere. Uranus' Heaviside was weak; ever and again it broke down beneath constant cosmic bombardment, permitting those devasting, body-destroying radiations to burst through. Which was another of the many reasons frail man must live in domed cities carven out of the frozen wilderness.

The 'Ranies were of hardier breed. Spawn of a mad desolation, all-knowing nature had supplied them with bodies able to endure infinite rigor. Yet even here, as man had discovered to his vast amazement, nature had followed the same rough pattern of form that characterized highest life on all planets. The Uranians walked upright on two legs; from their upper trunks branched jointed arms equipped with hands; hands, six fingers, an opposed thumb.

But there were differences, too. The Uranian sense of sight was an abortive sense. 'Ranies could differentiate only between tones of light and dark, otherwise they were colorblind—as might be expected in a land of white snow and black night. Their eating apparatus was equipped with extrasensitive taste-buds—a sharp necessity on a planet where the food supply was so limited. Their hearing was dulled by ages of exposure to howling gales and shrieking storms; they had no sense of smell. Which was not strange, considering the fact that they did not breathe through the nostrils, but

respired into a network of subcutaneous lung sponges through every pore of their bodies.

"Which," thought Baldy, "ain't hard to understand. What with an atmosphere of ammonia and stuff—"

The mean body temperature of the Uranians was a remarkable example of colloidal adaptability. Interior chemistry allowed them to withstand, naked, the biting frigidity of their native planet. Their garments were solely for the purposes of impediment-portage and personal adornment. Yet they did not suffer in the least when brought into the domed cities of the Earthmen. They seemed impervious to heat and cold alike; their lunged pores breathed, with equal facility, their own poisonous atmosphere and the oxygenated Earth atmosphere within the domes.

Baldy's driver brought his sled to a curving stop as the column before him set the style. And already Patrolmen, bulger-clad, armed, were clambering from the convoy. A company began moving toward a narrow pass to the right. Harrigan sought the flag sled of Colonel Cochrane.

"Colonel?"

"Ah, yes, warden. This is the defile you mentioned, isn't it?"

"Yes, sir. Only there's something funny. See them drifts?"

"Well?"

"They ain't normal for this time of year. Ought to be solid, instead of broken like that. This storm's so heavy it covers tracks almost immediate, but—"

"Yes?"

"Well, it looks to me like the 'Ranies is been on the march. And lately, too."

Colonel Cochrane said impatiently, "We'll know in a few minutes. The first company is approaching the caves now. Reynolds—catch that signal!"

A figure, dim in the heights above, was motioning to the commander below. The Signal Corps lieutenant watched intently. Cochrane watched the lieutenant, and Baldy watched the commander. An expression of surprise and alarm communicated itself to three faces, one after another.

"Yeah?" said Baldy. "There *is* something wrong?"

The lieutenant ignored him, made report to his commander.

"He says, sir, they have entered the caverns. But they are empty. The Uranians have gone."

"Gone! But . . . but gone where?"

Baldy, a wild surmise suddenly sweeping through him, had climbed to the top of a motosled. There was an old trick of hunters and trappers he had been taught in the Venusian junglelands. It was the stunt of "spotting" a trail by the "pearl necklace" method. You got a little elevation, closed your eyes, opened them suddenly. Where, in woodland, a trail had once existed, there would appear a dim, thin, weaving line that would linger for an instant, then disappear. Perhaps the same trick would work even on a snow-covered terrain. Everything would be white, of course. But the trail should be newer, closer packed, broken; should show against the smoothness of unbroken drift.

It did. Barely visible, disappearing even as his eyes strained to mark it. But unmistakable in direction and—in meaning!

"Colonel!"

"Yes, Harrigan?"

"They've marched," said Baldy in a strangled tone, "on the Colony!"

THERE WAS a jangling commotion at the ground lock. Bells rang, a siren screamed, the face of Hogan

leaped to the visiplate before Rusty Peters.

"They're coming in, Rusty."

"Good!" Rusty tossed one last look about him, nodded. Everything was in readiness. The boys were at their stations. The auditorium had been set in order for the little "party" he was planning. The necessary items had been brought from the storehouse; every last man had been instructed as to the part he must play.

Rusty hurried to the lock chamber. Johnson, Bridges and Howe stumbled in from outside, stomping powdery snow from their thick-soled antigrav boots. Rusty, heedless of biting cold metal, impatiently helped Johnson off with his bulger.

"You find 'em?" he demanded.

Johnson grunted.

"If we didn't, that's the D. T.'s chasing up across the valley. Like you said, they took out after us. They'll be here before you can say 'Andromeda'."

"Nice work!" enthused Rusty. "All right, Hogan—you know what to do next."

Hogan looked grave. He looked doubtful, too.

"Rusty, we've got a couple of rotor guns mounted on the topside turret. Don't you think it'd be a good idea to give 'em a couple of blasts, just to prove we won't stand for no monkey business—"

"That'll do! I'm in command here. You do what I said. The ideer o' this whole shindig is to solve the 'Ranie problem for all time, ain't it? Well, we ain't gonna do that by bumpin' off a handful of them an' lettin' the rest get away.

"This is gonna be the end of our troubles. The end which was wanted by the council when they decided on this day for a settlement— All right, boys! Everything out o' the lock chamber. It's gonna be cold in here when we let them gates open. Cold an' smelly."

Johnson, who had not heard this much of the plan before, gulped his dismay.

"You . . . you mean you're gonna let them come right into the dome? Invade us?"

"That's the general ideer," said Rusty jovially.

"But they'll *massacree* us!"

"Mebbe. I think not. We're prepared for them." Rusty chuckled tautly. "Wait till you get a look at our fust line o' defense. The auditorium. They got a big su'prise comin' to them, boy. O. K., Hogan. Open the lock!"

Hogan sighed. But his hand pressed a lever. The Earthmen fled from an exposed chamber as the gigantic air lock swung open invitingly.

BALDY HARRIGAN tapped his driver on the shoulder.

"Look, pal," he pleaded, "can't you get another hunk of speed out of this crate?"

The driver said, "Have to stay in formation, warden. Colonel's orders."

Baldy relaxed. Physically, that is. He threw himself back against the cushions, forcing his body to sit still. But his mind was aflame with anxiety.

Not too swiftly had the colonel accepted his opinion as to where the Uranians had gone. With the calm, unhurried precision of the trained Patrolman, he had insisted that the Scar Mountain refuge be searched thoroughly. Which resulted in nothing more than lost time—for the caverns were deserted.

Thus, hours had passed since Baldy's warning that the 'Ranies had marched on P. C. 1. And now,

belatedly, the companies were hurrying to the relief of what Baldy feared might be, by now, a desperately besieged post.

There was only one good thing about it. P. C. 1 was not far away. A half hour's run—and the thirty minutes had now nearly slipped beneath the motosled's gliders. Harrigan peered once more, and with feverish intensity, toward the dome which should soon loom through the white murk.

"There it is!" he cried.

The columns had spotted the prison; were swinging in a great arc to take positions before the ground lock. As his sled moved into its alloted post, Baldy squinted—and groaned.

"The lock! It's open!"

Then suddenly the motosled was at rest, and Harrigan was throwing himself from it, stumbling, slipping, racing awkwardly across the ground to the commander's sled.

"The ground lock's open, colonel! They've busted in!"

"I see that." Cochrane's face was grim. He rapped swift commands to his aides. "But, at any rate, we have them trapped now, Harrigan. If they've harmed any of your men, we will avenge—"

But Harrigan wasn't thinking of vengeance. He was thinking of Rusty. And of the dozens of others whom he'd left, yesterday, at P. C. 1. Friends of his, all of the men—even though they were exiles from Earth, even though they were convicts and he was their warden.

It seemed incredible that marauding 'Ranies should have been able to force entry into the dome—but the proof lay before his eyes. The outer lock gate gaping wide. There was still a chance, though, that the 'Ranies had not penetrated the secondary defense positions. There was another lock beyond this. Then the entire dome was so barred that a handful of men could defend themselves from many times their number for hours.

Baldy was in the van as the three Patrol companies marched in formation to the open lock. His dismay deepened as he saw the interior of that antechamber. There was something radically wrong here! He had half expected to find in the lock evidences of a battle. Charred bodies of the 'Ranie invaders, perhaps even the mangled remains of some of his own men.

There was—nothing! Only mute evidence that the Uranians had marched into the dome. For inside here, where the gales could not heap their huge drifts of frozen carbon dioxide, there were footprints in the thin hoarfrost.

And beyond?

THE RELIEF PARTY halted at the second lock. Baldy sprang to an audio unit, pressed its button with trembling fingers. Through its speaker emanated an echo of the tumult within the dome proper. And the Rocketeers heard that which can be, at times, the grimmest of all sounds—the sound of riotous laughter!

Baldy's cheeks were wet with unashamed tears.

"They've won! The damn, murdering scoundrels have taken the dome! They're in there torturing my men, gloating over it—"

And Colonel Cochrane's eyes were like bits of flint; his voice the rasp of a file on stone, as he snapped his grim command: "Make entry!"

Fourscore angry, vengeful men of the Space Patrol swung into action as one. The massive lock door shook before their efforts. A steel ram, wielded by strong arms, *croonged*

hollowly against the barrier, swung back, forward again. The audio speaker suddenly went dead as the laughter from within ended abruptly in frightened, curious cries. The voices of Uranians bellowed above the shouts of a few Earthlings. And then—

"What the hell," demanded an irate voice, "is going on out there!"

The lock wheezed asthmatically, swung back. Pumps sucked the foul Uranian air from the outer chamber, replaced it with fresh, pure, artificial Earth atmosphere. And Baldy started as, before him in the lock, appeared the figure of his friend and assistant, Rusty Peters!

"That's a hell of a way," roared Rusty aggrievedly, "to crash a party!"

ONCE, when Baldy was a young space swab, still wet behind the ears, he had made the mistake of trying to pet an ampie. The jolt of electricity that had knocked him sprawling on that occasion was a mild tingle compared to that which he now experienced as his eyes sought and found the auditorium behind Rusty.

The Uranians had invaded P. C. 1 —yes! But *how* they had invaded the station was another thing. If this was war—if this was murderous onslaught—

There was a huge table set in the middle of the hall. It was groaning like a festive board with every delicacy known to the storage bins of the Colony. Food galore, and drinks! And more drinks! And still more drinks!

And about this banquet table, shoulder to shoulder in riotous amity, were the men of P. C. 1 and their Uranian enemies. The laughter that had chilled Baldy's blood was not the gloating of fiends and ghouls—it was the gay, and not-too-sober laughter of men and 'Ranies having one hell of a good time!

Here a 'Ranie, his green-lipped slit-shaped mouth preposterously wide in a grin, attempted to eat the breast of a fried chicken and at the same time sing his joy. There an Earthman, weeping with mirth, related in high, intoxicated falsetto a joke that could, to his audience of polygamous Uranians, have seemed only mildly funny at best. Off in one corner a group of Uranians, confused but game, were trying to point their toneless voices to the harmony of a tune pounded on the piano by burly Don Larkin. And in another corner, a Uranian warrior was solemnly displaying his prowess with the blade by slicing, in midair, sugar lumps tossed at him by a circle of admiring cons.

Baldy stammered, "Wh-what . . . Rusty, I don't get it! What's it all about?"

But Colonel Cochrane was an opportunist. His keen mind sized the situation at a glance, and his order was curt.

"Nice work, Peters! Devilishly clever! Don't know how you did it, but you did! All right, men—grab the Uranians! Clap them in irons!"

"*Waaaait a minute!*" It was Rusty Peters' turn to look stunned. He barred the entrance as a group of Patrolmen leaped forward. "Grab them? Clap them in irons? Why?"

"That's all right, Peters. You can relax now. I'll take over. We'll find out which of them is Ras Tirl, beat the warlike ideas out of his head and—"

"But, dammit!" exploded Rusty, "you don't have to beat nothin' out o' nobody! This here's Ras Tirl! Hey, Ras! C'mere'n meet the boss o' the Space Patrol. Ras," he added

to the shocked colonel, "is a great guy. Him an' me's old pals, now."

THE OUTLAW chieftain ambled forward. Seven feet of brute strength surmounted by a foolish grin. Ras Tirl was a little bit drunk. He was also, it developed, a little bit on the amative side. He said, "Um frens Rusty, um frens Ras. Hokay. Murkissumuss!" He tried to kiss the colonel. The colonel backed away. Ras Tirl, still grinning, fell forward onto Baldy's shoulder, held on for dear life.

Rusty said, "See? It's all fixed up, colonel, just like the council wanted. We got peace at last. I opened up the outer lock, let 'em come in. Then I shot 'em a big dose of nitrous oxide; got 'em feelin' jovial. By the time they come out of it, me an' the men had carted 'em all into the banquet hall. Made a couple friendly speeches, told 'em from now on we was all buddies.

"They went for it like homeless pups. For years us Earthmen been pushin' 'em around, scarin' 'em, chasin' 'em, never givin' 'em a break. They almost wep' with joy. An' when they got their paws on that good food—the best they ever et in their lives—

"Well, anyhow, Ras give me his pledge that from now on his people'd keep peace with Earthmen. An' anybody will tell you that one thing a 'Ranie never does is go back on his word of honor. So—peace is here. And I'm sorry I misjudged the Patrol, colonel. Only yesterday I was tellin' Baldy the S. S. P. was a pack of bullies. I was wrong. It took kind hearts an' good guys to think up the ideer of makin' peace with the 'Ranies on this particular date. Hadn't it been for that fact, I'd of never thought of the ideer—"

"Day?" said Baldy. "What the blue blazes has the date got to do with it?"

"Yes, Peters," chimed in Colonel Cochrane. "Just why should you decide to adopt this successful but peaceful plan of operations on—of all days—*Empire* Day?"

RUSTY'S jaw sagged.

"Em-empire Day?"

"Why, yes. You knew, of course that—"

"Omigawd! Empire Day!" Rusty put his head in his hands, wagged it violently back and forth. "How the hell should I know! I done all this because I . . . I thought today was Chris'mas!"

He stared at Baldy dazedly. Ras Tirl, head cradled on Baldy's shoulder, opened his eyes and muttered, "Murkissmus!" and went back to sleep again. Baldy looked at the colonel. It seemed he should say something. He *had* to say something. He found the right words at last. He said:

"Colonel . . . suppose we all have a drink—"

Which wasn't a bad idea at that.

THE END.

THE MECHANICAL MICE

By Maurice G. Hugi

The inventor had spent twelve years perfecting the machine—a thing of marvelous complexity. Trouble was—he didn't know what it was he'd invented!

Illustrated by Schneeman

It's asking for trouble to fool around with the unknown. Burman did it! Now there are quite a lot of people who hate like the very devil anything that clicks, ticks, emits whirring sounds, or generally behaves like an asthmatic alarm clock. They've got mechanophobia. Dan Burman gave it to them.

Who hasn't heard of the Burman Bullfrog Battery? The same chap! He puzzled it out from first to last and topped it with his now world-famous slogan: "Power In Your Pocket." It was no mean feat to concoct a thing the size of a cigarette packet that would pour out a hundred times as much energy as its most efficient competitor. Burman differed from everyone else in thinking it a mean feat.

Burman looked me over very carefully, then said, "When that technical journal sent you around to see me twelve years ago, you listened sympathetically. You didn't treat me as if I were an idle dreamer or a congenital idiot. You gave me a decent write-up, and started all the publicity that eventually made me much money."

"Not because I loved you," I assured him, "but because I was honestly convinced that your battery was good."

"Maybe." He studied me in a way that conveyed he was anxious to get something off his chest. "We've been pretty pally since that time. We've filled in some idle hours together, and I feel that you're the one of my few friends to whom I can make a seemingly silly confession."

"Go ahead," I encouraged. We had been pretty pally, as he'd said. It was merely that we liked each other, found each other congenial. He was a clever chap, Burman, but there was nothing of the pedantic professor about him. Fortyish, normal, neat, he might have been a fashionable dentist to judge by appearances.

"Bill," he said, very seriously, "I didn't invent that damn battery."

"No?"

"No!" he confirmed. "I pinched the idea. What makes it madder is that I wasn't quite sure of what I was stealing and, crazier still, I don't know from whence I stole it."

"Which is as plain as a pikestaff," I commented.

"That's nothing. After twelve years of careful, exacting work I've built something else. It must be the most complicated thing in creation." He banged a fist on his knee, and his voice rose complainingly. "And now that I've done it, I don't know what I've done."

"Surely when an inventor experiments he knows what he's doing?"

"Not me!" Burman was amusingly lugubrious. "I've invented only one thing in my life, and that was more by accident than by good judgment." He perked up. "But that one thing was the key to a million notions. It gave me the battery. It has nearly given me things of greater importance. On several occasions it has nearly, but not quite, placed within my inadequate hands and half-understanding mind plans that would alter this world far beyond your conception." Leaning forward to lend emphasis to his speech, he said, "Now it has given me a mystery that has cost me twelve years of work and a nice sum of money. I finished it last night. I don't know what the devil it is."

"Perhaps if I had a look at it—"

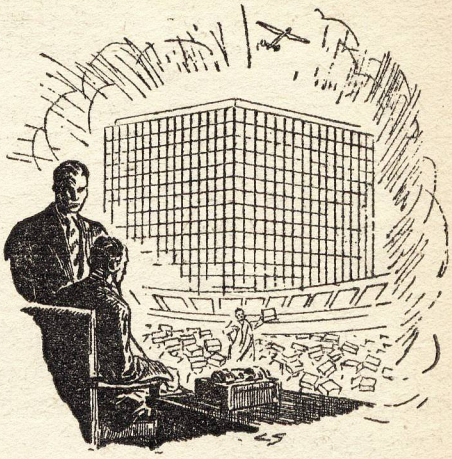
"Just what I'd like you to do." He switched rapidly to mounting enthusiasm. "It's a beautiful job of work, even though I say so myself. Bet you that you can't say what it is, or what it's supposed to do."

"Assuming it can do something," I put in.

"Yes," he agreed. "But I'm positive it has a function of some sort." Getting up, he opened a door. "Come along."

IT WAS a stunner. The thing was a metal box with a glossy, rhodium-plated surface. In general size and shape it bore a faint resemblance to an upended coffin, and had the same, brooding, ominous air of a casket waiting for its owner to give up the ghost.

There were a couple of small glass windows in its front through which could be seen a multitude of wheels as beautifully finished as those in a first-class watch. Elsewhere, several tiny lenses stared with sphinx-like indifference. There were three



small trapdoors in one side, two in the other, and a large one in the front. From the top, two knobbed rods of metal stuck up like goat's horns, adding a satanic touch to the thing's vague air of yearning for midnight burial.

"It's an automatic layer-outer," I suggested, regarding the contraption with frank dislike. I pointed to one of the trapdoors. "You shove the shroud in there, and the corpse comes out the other side reverently composed and ready wrapped."

"So you don't like its air, either," Burman commented. He lugged open a drawer in a nearby tier, hauled out a mass of drawings. "These are its innards. It has an electric circuit, valves, condensers, and something that I can't quite understand, but which I suspect to be a tiny, extremely efficient electric furnace. It has parts I recognize as cog-cutters and pinion-shapers. It embodies several small-scale multiple stampers, apparently for dealing with sheet metal. There are vague suggestions of an assembly line ending in that large compartment shielded by the door in front. Have a look at the drawings yourself. You can see it's an extremely

complicated device for manufacturing something only little less complicated."

The drawings showed him to be right. But they didn't show everything. Any efficient machine designer could correctly have deduced the gadget's function if given complete details. Burman admitted this, saying that some parts he had made "on the spur of the moment," while others he had been "impelled to draw." Short of pulling the machine to pieces, there was enough data to whet the curiosity, but not enough to satisfy it.

"Start the damn thing and see what it does."

"I've tried," said Burman. "It won't start. There's no starting handle, nothing to suggest how it can be started. I tried everything I could think of, without result. The electric circuit ends in those antenna at the top, and I even sent current through those, but nothing happened."

"Maybe it's a self-starter," I ventured. Staring at it, a thought struck me. "Timed," I added.

"Eh?"

"Set for an especial time. When the dread hour strikes, it'll go of its own accord, like a bomb."

"Don't be so melodramatic," said Burman, uneasily.

Bending down, he peered into one of the tiny lenses.

"*Bz-z-z!*" murmured the contraption in a faint undertone that was almost inaudible.

Burman jumped a foot. Then he backed away, eyed the thing warily, turned his glance at me.

"Did you hear that?"

"Sure!" Getting the drawings, I mauled them around. That little lens took some finding, but it was there all right. It has a selenium cell behind it. "An eye," I said. "It saw you, and reacted. So it isn't dead even if it does just stand there seeing no evil, hearing no evil, speaking no evil." I put a white handkerchief against the lens.

"*Bz-z-z!*" repeated the coffin, emphatically.

Taking the handkerchief, Burman put it against the other lenses. Nothing happened. Not a sound was heard, not a funeral note. Just nothing.

"It beats me," he confessed.

I'd got pretty fed up by this time. If the crazy article had performed, I'd have written it up and maybe I'd have started another financial snowball rolling for Burman's benefit. But you can't do anything with a box that buzzes whenever it feels temperamental. Firm treatment was required, I decided.

"You've been all nice and mysterious about how you got hold of this brain wave," I said. "Why can't you go to the same source for information about what it's supposed to be?"

"I'll tell you—or, rather, I'll show you."

FROM his safe, Burman dragged out a box, and from the box he produced a gadget. This one was far simpler than the useless mass of works over by the wall. It looked just like one of those old-fashioned crystal sets, except that the crystal was very big, very shiny, and was set in a horizontal vacuum tube. There was the same single dial, the same cat's whisker. Attached to the lot by a length of flex was what might have been a pair of headphones, except in place of the phones were a pair of polished, smoothly rounded copper circles shaped to fit outside the ears and close against the skull.

"My one and only invention," said

Burman, not without a justifiable touch of pride.

"What is it?"

"A time-traveling device."

"Ha, ha!" My laugh was very sour. I'd read about such things. In fact, I'd written about them. They were buncombe. Nobody could travel through time, either backward or forward. "Let me see you grow hazy and vanish into the future."

"I'll show you something very soon." Burman said it with assurance I didn't like. He said it with the positive air of a man who knows darned well that he can do something that everybody else knows darned well can't be done. He pointed to the crystal set. "It wasn't discovered at the first attempt. Thousands must have tried and failed. I was the lucky one. I must have picked a peculiarly individualistic crystal; I still don't know how it does what it does; I've never been able to repeat its performance even with a crystal apparently identical."

"And it enables you to travel in time?"

"Only forward. It won't take me backward, not even as much as one day. But it can carry me forward an immense distance, perhaps to the very crack of doom, perhaps everlastingly through infinity."

I had him now! I'd got him firmly entangled in his own absurdities. My loud chuckle was something I couldn't control.

"You can travel forward, but not backward, not even one day back. Then how the devil can you return to the present once you've gone into the future?"

"Because I never leave the present," he replied, evenly. "I don't partake of the future. I merely survey it from the vantage point of the present. All the same, it is time-traveling in the correct sense of the term." He seated himself. "Look here, Bill, what *are* you?"

"Who, me?"

"Yes, what are you." He went on to provide the answer. "Your name is Bill. You're a body and a mind. Which of them is Bill?"

"Both," I said, positively.

"True—but they're different parts of you. They're not the same even though they go around like Siamese twins." His voice grew serious. "Your body moves always in the present, the dividing line between the past and the future. But your mind is more free. It can think, and is in the present. It can remember, and at once is in the past. It can imagine, and at once is in the future, in its own choice of all the possible futures. *Your mind can travel through time!*"

He's outwitted me. I could find points to pick upon and argue about, but I knew that fundamentally he was right. I'd not looked at it from his angle before, but he was correct in saying that anyone could travel through time within the limits of his own memory and imagination. At that very moment I could go back twelve years and see him in my mind's eye as a younger man, paler, thinner, more excitable, not so cool and self-possessed. The picture was as perfect as my memory was excellent. For that brief spell I was twelve years back in all but the flesh.

"I call this thing a psychophone," Burman went on. "When you imagine what the future will be like, you make a characteristic choice of all the logical possibilities, you pick your favorite from a multitude of likely futures. The psychophone, somehow—the Lord alone knows how—tunes you into future *reality*. It makes you depict within your

mind the future as it will be shaped in actuality, eliminating all the alternatives that will not occur."

"An imagination-stimulator, a dream-machine," I scoffed, not feeling as sure of myself as I sounded. "How do you know it's giving you the McCoy?"

"Consistency," he answered, gravely. "It repeats the same features and the same trends far too often for the phenomena to be explained as mere coincidence. Besides," he waved a persuasive hand, "I got the battery from the future. It works, doesn't it?"

"It does," I agreed, reluctantly. I pointed to his psychophone. "I, too, may travel in time. How about letting me have a try? Maybe I'll solve your mystery for you."

"You can try if you wish," he replied, quite willingly. He pulled a chair into position. "Sit here, and I'll let you peer into the future."

CLIPPING the headband over my cranium, and fitting the copper rings against my skull where it sprouted ears, Burman connected his psychophone to the mains, switched it on; or rather he did some twiddling that I assumed was a mode of switching on.

"All you have to do," he said, "is to close your eyes, compose yourself, then try and permit your imagination to wander into the future."

He meddled with the cat's whisker. A couple of times he said, "Ah!" And each time he said it I got a peculiar dithery feeling around my unfortunate ears. After a few seconds of this, he drew it out to, "A-a-ah!" I played unfair, and peeped beneath lowered lids. The crystal was glowing like rats' eyes in a forgotten cellar. A furtive crimson.

Closing my own optics, I let my mind wander. Something was flowing between those copper electrodes, a queer, indescribable something that felt with stealthy fingers at some secret portion of my brain. I got the asinine notion that they were the dexterous digits of a yet-to-be-born magician who was going to shout, "Presto!" and pull my abused lump of think-meat out of a thirtieth century hat—assuming they'd wear hats in the thirtieth century.

What was it like, or, rather, what would it be like in the thirtieth century? Would there be retrogression? Would humanity again be composed of scowling, fur-kilted creatures lurking in caves? Or had progress continued—perhaps even to the development of men like gods?

Then it happened! I swear it! I pictured, quite voluntarily, a savage, and then a huge-domed individual with glittering eyes—the latter being my version of the ugliness we hope to attain. Right in the middle of this erratic dreaming, those weird fingers warped my brain, dissolved my phantoms, and replaced them with a dictated picture which I witnessed with all the helplessness and clarity of a nightmare.

I saw a fat man spouting. He was quite an ordinary man as far as looks went. In fact, he was so normal that he looked henpecked. But he was attired in a Roman toga, and he wore a small, black box where his laurel wreath ought to have been. His audience was similarly dressed, and all were balancing their boxes like a convention of fish porters. What Fatty was orating sounded gabble to me, but he said his piece as if he meant it.

The crowd was in the open air, with great, curved rows of seats visible in the background. Presumably an outside auditorium of some sort.

Judging by the distance of the back rows, it must have been a devil of a size. Far behind its sweeping ridge a great edifice jutted into the sky, a cubical erection with walls of glossy squares, like an immense glasshouse.

"F'wot?" bellowed Fatty, with obvious heat. "Wuk, wuk, wuk, mor, noon'n'ni'! Bok onned, ord this, ord that." He stuck an indignant finger against the mysterious object on his cranium. "Bok onned, wuk, wuk, wuk. F'wot?" he glared around. "F'nix!" The crowd murmured approval somewhat timidly. But it was enough for Fatty. Making up his mind, he flourished a plump fist and shouted, "Th'ell wit'm!" Then he tore his box from his pate.

Nobody said anything, nobody moved. Dumb and wide-eyed, the crowd just stood and stared as if paralyzed by the sight of a human being sans box. Something with a long, slender streamlined body and broad wings soared gracefully upward in the distance, swooped over the auditorium, but still the crowd neither moved nor uttered a sound.

A smile of triumph upon his broad face, Fatty bawled, "Lem see'm make wuk now! Lem see'm—"

He got no further. With a rush of mistiness from its tail, but in perfect silence, the soaring thing hovered and sent down a spear of faint, silvery light. The light touched Fatty. He rotted where he stood, like a victim of ultra-rapid leoprosy. He rotted, collapsed, crumbled within his sagging clothes, became dust as once he had been dust. It was horrible.

The watchers did not flee in utter panic; not one expression of fear, hatred or disgust came from their tightly closed lips. In perfect silence they stood there, staring, just staring, like a horde of wooden soldiers. The thing in the sky circled to survey its handiwork, then dived low over the mob, a stubby antenna in its prow sparking furiously. As one man, the crowd turned left. As one man it commenced to march, left, right, left, right.

TEARING OFF the headband, I told Burman what I'd seen, or what his contraption had persuaded me to think that I'd seen. "What the deuce did it mean?"

"Automatons," he murmured. "Glasshouses and reaction ships." He thumbed through a big diary filled with notations in his own hands. "Ah, yes, looks like you were very early in the thirtieth century. Unrest was persistent for twenty years prior to the Antibox Rebellion."

"What rebellion?"

"The Antibox—the revolt of the automatons against the thirtieth century Technocrats. Jackson-Dkj-99717, a successful and cunning schemer with a warped box, secretly warped hundreds of other boxes, and eventually led the rebels to victory in 30047. His great grandson, a greedy, thick-headed individual, caused the rebellion of the Boxless Freemen against his own clique of Jacksocrats."

I gaped at this recital, then said, "The way you tell it makes it sound like history."

"Of course it's history," he asserted. "History that is yet to be." He was pensive for a while. "Studying the future will seem a weird process to you, but it appears quite a normal procedure to me. I've done it for years, and maybe familiarity has bred contempt. Trouble was, though, that selectivity is poor. You can pick on some especial period twenty times in succes-

sion, but you'll never find yourself in the same month, or even the same year. In fact, you're fortunate if you strike twice in the same decade. Result is that my data is very erratic."

"I can imagine that," I told him. "A good guesser can guess the correct time to within a minute or two, but never to within ten or even fifty seconds."

"Quite!" he responded. "So the hell of it has been that mine was the privilege of watching the panorama of the future, but in a manner so sketchy that I could not grasp its prizes. Once I was lucky enough to watch a twenty-fifth century power pack assembled from first to last. I got every detail before I lost the scene which I've never managed to hit upon again. But I made that power pack—and you know the result."

"So that's how you concocted your famous battery!"

"It is! But mine, good as it may be, isn't as good as the one I saw. Some slight factor is missing." His voice was suddenly tight when he added, "I missed something because I had to miss it!"

"Why?" I asked, completely puzzled.

"Because history, past or future, permits no glaring paradox. Because, having snatched this battery from the twenty-fifth century, I am recorded in that age as the twentieth-century inventor of the thing. They've made a mild improvement to it in those five centuries, but that improvement was automatically withheld from me. Future history is as fixed and unalterable by those of the present time as is the history of the past."

"Then," I demanded, "explain to me that complicated contraption which does nothing but say *bz-z-z*."

"Damn it!" he said, with open ire, "that's just what's making me crazy! It can't be a paradox, it just can't." Then, more carefully, "So it must be a seeming paradox."

"O. K. You tell me how to market a seeming paradox, and the commercial uses thereof, and I'll give it a first-class write-up."

Ignoring my sarcasm, he went on, "I tried to probe the future as far as human minds can probe. I saw nothing, nothing but the vastness of a sterile floor upon which sat a queer machine, gleaming there in silent, solitary majesty. Somehow, it seemed aware of my scrutiny across the gulf of countless ages. It held my attention with a power almost hypnotic. For more than a day, for a full thirty hours, I kept that vision without losing it—the longest time I have ever kept a future scene."

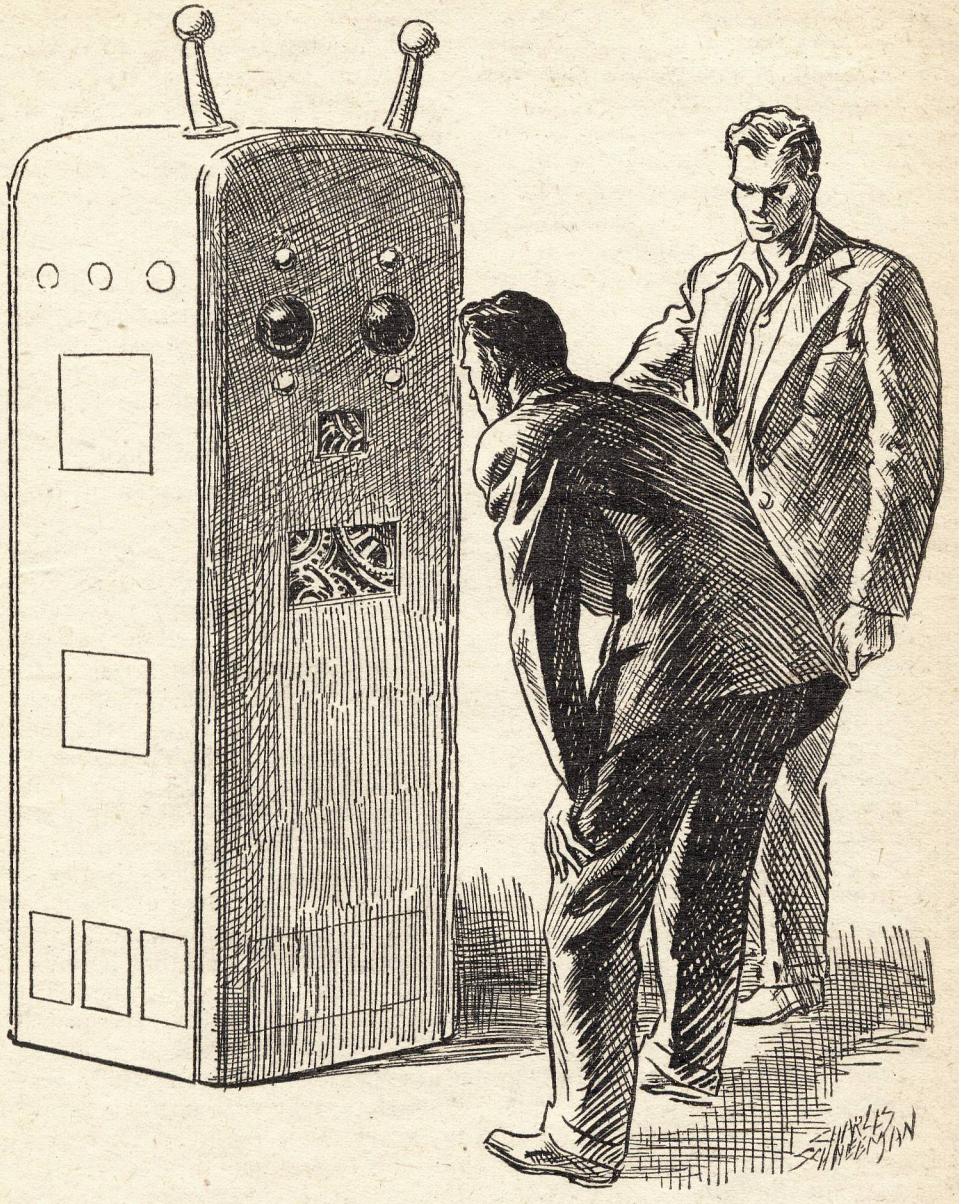
"Well?"

"I drew it. I made complete drawings of it, performing the task with all the easy confidence of a trained machine draughtsman. Its insides could not be seen, but somehow they came to me, somehow I knew them. I lost the scene at four o'clock in the morning, finding myself with masses of very complicated drawings, a thumping head, heavy-lidded eyes, and a half-scared feeling in my heart." He was silent for a short time. "A year later I plucked up courage and started to build the thing I had drawn. It cost me a hell of a lot of time and a hell of a lot of money. But I did it—it's finished."

"And all it does is buzz," I remarked, with genuine sympathy.

"Yes," he sighed, doubtfully.

There was nothing more to be said. Burman gazed moodily at the wall, his mind far, far away. I fiddled aimlessly with the copper earpieces of the psychophone. My



"I know I made it—but I don't know what it is. It just stands there and does nothing, but anything that involved must do something."

imagination, I reckoned, was as good as anyone's, but for the life of me I could neither imagine nor suggest a profitable market for a metal coffin filled with watchmaker's junk. No, not even if it did make odd noises.

A faint, smooth *whir* came from the coffin. It was a new sound that swung us round to face it pop-eyed. *Whir-r-r!* it went again. I saw finely machined wheels spin behind the window in its front.

"Good heavens!" said Burman.

Bz-z-z! Whir-r! Click! The whole affair suddenly slid sidewise on its hidden castors.

THE DEVIL you know isn't half so frightening as the devil you don't. I don't mean that this sudden demonstration of life and motion got us scared, but it certainly made us leery, and our hearts put in an extra dozen bumps a minute. This coffin-thing was, or might be, a devil we didn't know. So we stood there, side by side, gazing at it fascinatedly, feeling apprehensive of we knew not what.

Motion ceased after the thing had slid two feet. It stood there, silent, imperturbable, its front lenses eying us with glassy lack of expression. Then it slid another two feet. Another stop. More meaningless contemplation. After that, a swifter and farther slide that brought it right up to the laboratory table. At that point it ceased moving, began to emit varied but synchronized ticks like those of a couple of sympathetic grandfather clocks.

Burman said, quietly, "Something's going to happen!"

If the machine could have spoken it would have taken the words right out of his mouth. He'd hardly uttered the sentence when a trapdoor in the machine's side fell open, a jointed, metallic arm snaked cautiously through the opening and reached for a marine chronometer standing on the table.

With a surprised oath, Burman dashed forward to rescue the chronometer. He was too late. The arm grabbed it, whisked it into the machine, the trapdoor shut with a hard snap, like the vicious clash of a sprung bear trap. Simultaneously, another trapdoor in the front flipped open, another jointed arm shot out and in again, spearing with ultra-rapid motion too fast to follow. That trapdoor also snapped shut, leaving Burman gaping down at his torn clothing from which his expensive watch and equally expensive gold chain had been ripped away.

"Good heavens!" said Burman, backing from the machine.

We stood looking at it a while. It didn't move again, just posed there ticking steadily as if ruminating upon its welcome meal. Its lenses looked at us with all the tranquil lack of interest of a well-fed cow. I got the idiotic notion that it was happily digesting a mess of cogs, pinions and wheels.

Because its subtle air of menace seemed to have faded away, or maybe because we sensed its entire preoccupation with the task in hand, we made an effort to rescue Burman's valuable timepiece. Burman tugged mightily at the trapdoor through which his watch had gone, but failed to move it. I tugged with him, without result. The thing was sealed as solidly as if welded in. A large screwdriver failed to pry it open. A crowbar, or a good jimmy would have done the job, but at that point Burman decided that he didn't want to damage the machine which had cost him more than the watch.

Tick-tick-tick! went the coffin, stolidly. We were back where we'd started, playing with our fingers, and no wiser than before. There was nothing to be done, and I felt that the accursed contraption knew it. So it stood there, gaping through its lenses, and jeered *tick-tick-tick*. From its belly, or where its belly would have been if it'd had one, a slow warmth radiated. According to Burman's drawings, that was the location of the tiny electric furnace.

The thing was functioning; there could be no doubt about that! If

Burman felt the same way as I did, he must have been pretty mad. There we stood, like a couple of prize boobs, not knowing what the machine was supposed to do, and all the time it was doing under our very eyes whatever it was designed to do.

From where was it drawing its power? Were those antennæ sticking like horns from its head busily sucking current from the atmosphere? Or was it, perhaps, absorbing radio power? Or did it have internal energy of its own? All the evidence suggested that it was making something, giving birth to something, but giving birth to what?

Tick-tick-tick! was the only reply.

Our questions were still unanswered, our curiosity was still unsatisfied, and the machine was still ticking industriously at the hour of midnight. We surrendered the problem until next morning. Burman locked and double-locked his laboratory before we left.

POLICE OFFICER Burke's job was a very simple one. All he had to do was walk round and round the block, keeping a wary eye on the stores in general and the big jewel depot in particular, phoning headquarters once per hour from the post at the corner.

Night work suited Burke's taciturn disposition. He could wander along, communing with himself, with nothing to bother him or divert him from his inward ruminations. In that particular section nothing ever happened at night, nothing.

Stopping outside the gem-bedecked window, he gazed through the glass and the heavy grille behind it to where a low-power bulb shed light over the massive safe. There was a rajah's ransom in there. The guard, the grille, the automatic alarms and sundry ingenious traps preserved it from the adventurous fingers of anyone who wanted to ransom a rajah. Nobody had made the brash attempt in twenty years. Nobody had even made a try for the contents of the grille-protected window.

He glanced upward at a faintly luminescent path of cloud behind which lay the hidden moon. Turning, he strolled on. A cat sneaked past him, treading cautiously, silently, and hugging the angle of the wall. His sharp eyes detected its slinking shape even in the nighttime gloom, but he ignored it and progressed to the corner.

Back of him, the cat came below the window through which he just had stared. It stopped, one forefoot half-raised, its ears cocked forward. Then it flattened belly-low against the concrete, its burning orbs wide, alert, intent. Its tail waved slowly from side to side.

Something small and bright came skittering toward it, moving with mouselike speed and agility close in the angle of the wall. The cat tensed as the object came nearer. Suddenly, the thing was within range, and the cat pounced with lithe eagerness. Hungry paws dug at a surface that was not soft and furry, but hard, bright and slippery. The thing darted around like a clockwork toy as the cat vainly tried to hold it. Finally, with an angry snarl, the cat swiped it viciously, knocking it a couple of yards where it rolled onto its back and emitted softly protesting clicks and tiny, urgent impulses that its feline attacker could not sense.

Gaining the gutter with a single leap, the cat crouched again. Something else was coming. The cat muscled, its eyes glowed. Another

object slightly similar to the curious thing it had just captured, but a little bit bigger, a fraction noisier, and much different in shape. It resembled a small, gold-plated cylinder with a conical front from which projected a slender blade, and it slid along swiftly on invisible wheels.

Again the cat leaped. Down on the corner, Burke heard its brief shriek and following gargle. The sound didn't bother Burke—he'd heard cats and rats and other vermin make all sorts of queer noises in the night. Phlegmatically, he continued on his beat.

Three quarters of an hour later, Police Officer Burke had worked his way around to the fatal spot. Putting his flash on the body, he rolled the supine animal over with his foot. Its throat was cut. Its throat had been cut with an utter savagery that had half-severed its head from its body. Burke scowled down at it. He was no lover of cats himself, but he found difficulty in imagining anyone hating like that!

"Somebody," he muttered, "wants flaying alive."

His big foot shoved the dead cat back into the gutter where street cleaners could cart it away in the morning. He turned his attention to the window, saw the light still glowing upon the untouched safe. His mind was still on the cat while his eyes looked in and said that something was wrong. Then he dragged his attention back to business, realized what was wrong, and sweated at every pore. It wasn't the safe, it was the window.

In front of the window the serried trays of valuable rings still gleamed undisturbed. To the right, the silverware still shone untouched. But on the left had been a small display of delicate and extremely expensive watches. They were no longer there, not one of them. He remembered that right in front had rested a neat, beautiful calendar-chronometer priced at a year's salary. That, too, was gone.

The beam of his flash trembled as he tried the gate, found it fast, secure. The door behind it was firmly locked. The transom was closed, its heavy wire guard still securely fixed. He went over the window, eventually found a small, neat hole, about two inches in diameter, down in the corner on the side nearest the missing display.

BURKE'S CURSE was explosive as he turned and ran to the corner. His hand shook with indignation while it grabbed the telephone from its box. Getting headquarters, he recited his story. He thought he'd a good idea of what had happened, fancied he'd read once of a similar stunt being pulled elsewhere.

"Looks like they cut a disk with a rotary diamond, lifted it out with a suction cup, then fished through the hole with a telescopic rod." He listened a moment, then said, "Yes, yes. That's just what gets me—the rings are worth ten times as much."

His still-startled eyes looked down the street while he paid attention to the voice at the other end of the line. The eyes wandered slowly, descended, found the gutter, remained fixed on the dim shape lying therein. Another dead cat! Still clinging to his phone, Burke moved out as far as the cord would allow, extended a boot, rolled the cat away from the curb. The flash settled on it. Just like the other—ear to ear!

"And listen," he shouted into the phone, "some maniac's wandering around slaughtering cats."

Replacing the phone, he hurried

back to the maltreated window, stood guard in front of it until the police car rolled up. Four piled out.

The first said, "Cats! I'll say somebody's got it in for cats! We passed two a couple of blocks away. They were bang in the middle of the street, flat in the headlights, and had been damn near guillotined. Their bodies were still warm."

The second grunted, approached the window, stared at the small, neat hole, and said, "The mob that did this would be too cute to leave a print."

"They weren't too cute to leave the rings," growled Burke.

"Maybe you've got something there," conceded the other. "If they've left the one, they might have left the other. We'll test for prints, anyway."

A taxi swung into the dark street, pulled up behind the police car. An elegantly dressed, fussy, and very agitated individual got out, rushed up to the waiting group. Keys jangled in his pale, moist hand.

"Maley, the manager—you phoned me," he explained, breathlessly. "Gentlemen, this is terrible, terrible! The window show is worth thousands, thousands! What a loss, what a loss!"

"How about letting us in?" asked one of the policemen, calmly.

"Of course, of course."

Jerkily, he opened the gate, unlocked the door, using about six keys for the job. They walked inside. Maley switched on the lights, stuck his head between the plate-glass shelves, surveyed the depleted window.

"My watches, my watches," he groaned.

"It's awful, it's awful!" said one of the policemen, speaking with beautiful solemnity. He favored his companions with a sly wink.

Maley leaned farther over, the better to inspect an empty corner. "All gone, all gone," he moaned, "all my show of the finest makes in — *Yeeouw!*" His yelp made them jump. Maley bucked as he tried to force himself through the obstructing shelves toward the grille and the window beyond it. "My watch! My own watch!"

The others tiptoed, stared over his shoulders, saw the gold buckle of a black velvet fob go through the hole in the window. Burke was the first outside, his ready flash searching the concrete. Then he spotted the watch. It was moving rapidly along, hugging the angle of the wall, but it stopped dead as his beam settled upon it. He fancied he saw something else, equally bright and metallic, scoot swiftly into the darkness beyond the circle of his beam.

Picking up the watch, Burke stood and listened. The noises of the others coming out prevented him from hearing clearly, but he could have sworn he'd heard a tiny whirring noise, and a swift, juicy ticking that was not coming from the instrument in his hand. Must have been only his worried fancy. Frowning deeply, he returned to his companions.

"There was nobody," he asserted. "It must have dropped out of your pocket and rolled."

Damn it, he thought, could a watch roll that far? What the devil was happening this night? Far up the street, something screeched, then it bubbled. Burke shuddered—he could make a shrewd guess at that! He looked at the others, but apparently they hadn't heard the noise.

THE PAPERS gave it space in the morning. The total was sixty watches and eight cats, also some

oddments from the small stock of a local scientific instrument maker. I read about it on my way down to Burman's place. The details were fairly lavish, but not complete. I got them completely at a later time when we discovered the true significance of what had occurred.

Burman was waiting for me when I arrived. He appeared both annoyed and bothered. Over in the corner, the coffin was ticking away steadily, its noise much louder than it had been the previous day. The thing sounded a veritable hive of industry.

"Well?" I asked.

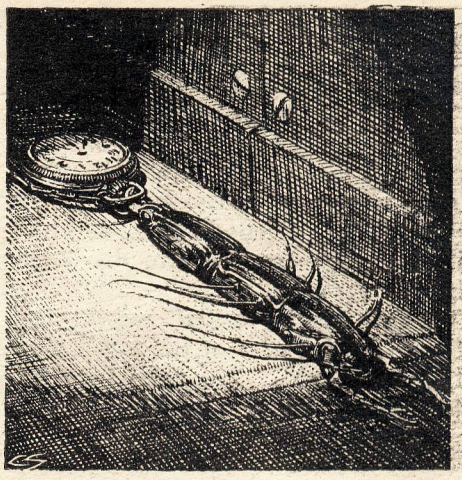
"It's moved around a lot during the night," said Burman. "It's smashed a couple of thermometers and taken the mercury out of them. I found some drawers and cupboards shut, some open, but I've an uneasy feeling that it's made a thorough search through the lot. A packet of nickel foil has vanished, a coil of copper wire has gone with it." He pointed an angry finger at the bottom of the door through which I'd just entered. "And I blame it for gnawing ratholes in that. They weren't there yesterday."

Sure enough, there were a couple of holes in the bottom of that door. But no rat made those—they were neat and smooth and round, almost as if a carpenter had cut them with a keyhole saw.

"Where's the sense in it making those?" I questioned. "It can't crawl through apertures that size."

"Where's the sense in the whole affair?" Burman countered. He glowered at the busy machine which stared back at him with its expressionless lenses and churned steadily on. *Tick-tick-tick!* persisted the confounded thing. Then, *whir-thump-click!*

I opened my mouth intending to



voice a nice, sarcastic comment at the machine's expense when there came a very tiny, very subtle and extremely high-pitched whine. Something small, metallic, glittering shot through one of the rat holes, fled across the floor toward the churning monstrosity. A trapdoor opened and swallowed it with such swiftness that it had disappeared before I realized what I'd seen. The thing had been a cylindrical, polished object resembling the shuttle of a sewing machine, but about four times the size. And it had been dragging something also small and metallic.

Burman stared at me; I stared at Burman. Then he foraged around the laboratory, found a three-foot length of half-inch steel pipe. Dragging a chair to the door, he seated himself, gripped the pipe like a bludgeon, and watched the rat holes. Imperturbably, the machine watched him and continued to *tick-tick-tick.*

Ten minutes later, there came a sudden click and another tiny whine. Nothing darted inward through the holes, but the curious object we'd already seen—or another one exactly like it—dropped out of the trap, scooted to the door by which we

were waiting. It caught Burman by surprise. He made a mad swipe with the steel as the thing skittered elusively past his feet and through a hole. It had gone even as the weapon walloped the floor.

"Damn!" said Burman, heartily. He held the pipe loosely in his grip while he glared at the industrious coffin. "I'd smash it to bits except that I'd like to catch one of these small gadgets first."

"Look out!" I yelled.

He was too late. He ripped his attention away from the coffin toward the holes, swinging up the heavy length of pipe, a startled look on his face. But his reaction was far too slow. Three of the little mysteries were through the holes and halfway across the floor before his weapon was ready to swing. The coffin swallowed them with the crash of a trapdoor.

The invading trio had rushed through in single file, and I'd got a better picture of them this time. The first two were golden shuttles, much like the one we'd already seen. The third was bigger, speedier, and gave me the notion that it could dodge around more dexterously. It had a long, sharp projection in front, a wicked, ominous thing like a surgeon's scalpel. Sheer speed deprived me of a good look at it, but I fancied that the tip of the scalpel had been tinged with red. My spine exuded perspiration.

CAME an irritated scratching upon the outside of the door and a white-tipped paw poked tentatively through one of the holes. The cat backed to a safe distance when Burman opened the door, but looked lingeringly toward the laboratory. Its presence needed no explaining—the alert animal must have caught a glimpse of those infernal little whizzers. The same thought struck both of us; cats are quick on the pounce, very quick. Given a chance, maybe this one could make a catch for us.

We enticed it in with fair words and soothing noises. Its eagerness overcame its normal caution toward strangers, and it entered. We closed the door behind it; Burman got his length of pipe, sat by the door, tried to keep one eye on the holes and the other on the cat. He couldn't do both, but he tried. The cat sniffed and prowled around, mewed defeatedly. Its behavior suggested that it was seeking by sight rather than scent. There wasn't any scent.

With feline persistence, the animal searched the whole laboratory. It passed the buzzing coffin several times, but ignored it completely. In the end, the cat gave it up, sat on the corner of the laboratory table and started to wash its face.

Tick-tick-tick! went the big machine. Then *whir-thump!* A trap popped open, a shuttle fell out and raced for the door. A second one followed it. The first was too fast even for the cat, too fast for the surprised Burman as well. *Bang!* The length of steel tube came down viciously as the leading shuttle bulleted triumphantly through a hole.

But the cat got the second one. With a mighty leap, paws extended claws out, it caught its victim one foot from the door. It tried to handle the slippery thing, failed, lost it for an instant. The shuttle whisked around in a crazy loop. The cat got it again, lost it again, emitted an angry snarl, batted it against the skirting board. The shuttle lay there, upside down, four midget wheels in its underside spinning madly with a high, almost inaudible whine.

Eyes alight with excitement, Burman put down his weapon, went to pick up the shuttle. At the same time, the cat slunk toward it ready to play with it. The shuttle lay there, helplessly functioning upon its back, but before either could reach it the big machine across the room went *clunk!* opened a trap and ejected another gadget.

With astounding swiftness, the cat turned and pounced upon the newcomer. Then followed pandemonium. Its prey swerved agilely with a fitful gleam of gold; the cat swerved with it, cursed and spat. Black-and-white fur whirled around in a fighting haze in which gold occasionally glowed; the cat's hissings and spittings overlay a persistent whine that swelled and sank in the manner of accelerating or decelerating gears.

A peculiar gasp came from the cat, and blood spotted the floor. The animal clawed wildly, emitted another gasp followed by a gurgle. It shivered and flopped, a stream of crimson pouring from the great gash in its gullet.

We'd hardly time to appreciate the full significance of the ghastly scene when the victor made for Burman. He was standing by the skirting board, the still-buzzing shuttle in his hand. His eyes were sticking out with utter horror, but he retained enough presence of mind to make a frantic jump a second before the bulleting menace reached his feet.

He landed behind the thing, but it reversed in its own length and came for him again. I saw the mirrorlike sheen of its scalpel as it banked at terrific speed, and the sheen was drowned in sticky crimson two inches along the blade. Burman jumped over it again, reached the lab table, got up on that.

"Lord!" he breathed.

By this time I'd got the piece of pipe which he'd discarded. I hefted it, feeling its comforting weight, then did my best to bat the buzzing lump of wickedness through the window and over the roofs. It was too agile for me. It whirled, accelerated, dodged the very tip of the descending steel, and flashed twice around the table upon which Burman had taken refuge. It ignored me completely. Somehow, I felt that it was responding entirely to some mysterious call from the shuttle Burman had captured.

I swiped desperately, missed it again, though I swear I missed by no more than a millimeter. Something whipped through the holes in the door, fled past me into the big machine. Dimly, I heard traps opening and closing, and beyond all other sounds that steady, persistent *tick-tick-tick.* Another furious blow that accomplished no more than to dent the floor and jar my arm to the shoulder.

Unexpectedly, unbelievably, the golden curse ceased its insane gyrations on the floor and around the table. With a hard click, and a whir much louder than before, it raced easily up one leg of the table and reached the top.

BURMAN LEFT his sanctuary in one jump. He was still clinging to the shuttle. I'd never seen his face so white.

"The machine!" he said, hoarsely. "Bash it to hell!"

Thunk! went the machine. A trap gaped, released another demon with a scalpel. *Tzz-z-z!* a third shot in through the holes in the door. Four shuttles skimmed through behind it, made for the machine, reached it safely. A fifth came through more slowly. It was drag-

ging an automobile valve spring. I kicked the thing against the wall even as I struck a vain blow at one with a scalpel.

With another jump, Burman cleared an attacker. A second sheared off the toe of his right shoe as he landed. Again he reached the table from which his first foe had departed. All three things with scalpels made for the table with a reckless vim that was frightening.

"Drop that damned shuttle," I yelled.

He didn't drop it. As the fighting trio whirred up the legs, he flung the shuttle with all his might at the coffin that had given it birth. It struck, dented the casing, fell to the floor. Burman was off the table again. The thrown shuttle lay battered and noiseless, its small motive wheels stilled.

The armed contraptions scooting around the table seemed to change their purpose coincidently with the captured shuttle's smashing. Together, they dived off the table, sped through the holes in the door. A fourth came out of the machine, escorting two shuttles, and those too vanished beyond the door. A second or two later, a new thing, different from the rest, came in through one of the holes. It was long, round-bodied, snub-nosed, about half the length of a policeman's nightstick, had six wheels beneath, and a double row of peculiar serrations in front. It almost sauntered across the room while we watched it fascinatedly. I saw the serrations jerk and shift when it climbed the lowered trap into the machine. They were midget caterpillar tracks!

Burman had had enough. He made up his mind. Finding the steel pipe, he gripped it firmly, approached the coffin. Its lenses seemed to leer at him as he stood before it. Twelve years of intensive work to be destroyed at a blow. Endless days and nights of effort to be undone at one stroke. But Burman was past caring. With a ferocious swing he demolished the glass, with a fierce thrust he shattered the assembly of wheels and cogs behind.

The coffin shuddered and slid beneath his increasingly angry blows. Trapdoors dropped open, spilled out lifeless samples of the thing's metallic brood. Grindings and raspings came from the accursed object while Burman battered it to pieces. Then it was silent, stilled, a shapeless, useless mass of twisted and broken parts.

I picked up the dented shape of the object that had sauntered in. It was heavy, astonishingly heavy, and even after partial destruction its workmanship looked wonderful. It had a tiny, almost unnoticeable eye in front, but the miniature lens was cracked. Had it returned for repairs and overhaul?

"That," said Burman, breathing audibly, "is that!"

I opened the door to see if the noise had attracted attention. It hadn't. There was a lifeless shuttle outside the door, a second a yard behind it. The first had a short length of brass chain attached to a tiny hook projecting from its rear. The nose cap of the second had opened fanwise, like an iris diaphragm, and a pair of jointed metal arms were folded inside, hugging a medium-sized diamond. It looked as if they'd been about to enter when Burman destroyed the big machine.

Picking them up, I brought them in. Their complete inactivity, though they were undamaged, sug-

gested that they had been controlled by the big machine and had drawn their motive power from it. If so, then we'd solved our problem simply, and by destroying the one had destroyed the lot.

Burman got his breath back and began to talk.

He said, "The Robot Mother! That's what I made—a duplicate of the Robot Mother. I didn't realize it, but I was patiently building the most dangerous thing in creation, a thing that is a terrible menace because it shares with mankind the ability to propagate. Thank Heaven we stopped it in time!"

"So," I remarked, remembering that he claimed to have got it from the extreme future, "that's the eventual master, or mistress, of Earth. A dismal prospect for humanity, eh?"

"Not necessarily. I don't know just how far I got, but I've an idea it was so tremendously distant in the future that Earth had become sterile from humanity's viewpoint. Maybe we'd emigrated to somewhere else in the cosmos, leaving our semi-intelligent slave machines to fight for existence or die. They fought—and survived."

"And then wangle things to try and alter the past in their favor," I suggested.

"No, I don't think so." Burman had become much calmer by now. "I don't think it was a dastardly attempt so much as an interesting experiment. The whole affair was damned in advance because success would have meant an impossible paradox. There are no robots in the next century, nor any knowledge of them. Therefore the intruders in this time must have been wiped out and forgotten."

"Which means," I pointed out, "that you must not only have destroyed the machine, but also all your drawings, all your notes, as well as the psychophone, leaving nothing but a few strange events and a story for me to tell."

"Exactly—I shall destroy everything. I've been thinking over the whole affair, and it's not until now I've understood that the psychophone can never be of the slightest use to me. It permits me to discover or invent only those things that history has decreed I shall invent, and which, therefore, I shall find with or without the contraption. I can't play tricks with history, past or future."

"Humph!" I couldn't find any flaw in his reasoning. "Did you notice," I went on, "the touch of bee-psychology in our antagonists? You built the hive, and from it emerged workers, warriors, and"—I indicated the dead saunterer—"one drone."

"Yes," he said, lugubriously. "And I'm thinking of the honey—eighty watches! Not to mention any other items the late papers may report, plus any claims for slaughtered cats. Good thing I'm wealthy."

"Nobody knows you've anything to do with those incidents. You can pay secretly if you wish."

"I shall," he declared.

"Well," I went on, cheerfully, "all's well that ends well. Thank goodness we've got rid of what we brought upon ourselves."

With a sigh of relief, I strolled toward the door. A high whine of midget motors drew my startled attention downward. While Burman and I stared aghast, a golden shuttle slid easily through one of the rat holes, sensed the death of the

Robot Mother and scooted back through the other hole before I could stop it.

If Burman had been shaken before, he was doubly so now. He came over to the door, stared incredulously at the little exit just used by the shuttle, then at the couple of other undamaged but lifeless shuttles lying about the room.

"Bill," he mouthed, "your bee analogy was perfect. Don't you understand? There's another swarm! A queen got loose!"

THERE WAS another swarm all right. For the next forty-eight hours it played merry hell. Burman spent the whole time down at headquarters trying to convince them that his evidence wasn't just a fantastic story, but what helped him to persuade the police of his veracity was the equally fantastic reports that came rolling in.

To start with, old Gildersome heard a crash in his shop at midnight, thought of his valuable stock of cameras and miniature movie projectors, pulled on his pants and rushed downstairs. A razor-sharp instrument stabbed him through the right instep when halfway down, and he fell the rest of the way. He lay there, badly bruised and partly stunned, while things clicked, ticked and whirred in the darkness and the gloom. One by one, all the contents of his box of expensive lenses went through a hole in the door. A quantity of projector cogs and wheels went with them.

Ten people complained of being robbed in the night of watches and alarm clocks. Two were hysterical. One swore that the bandit was "a six-inch cockroach" which purred like a toy dynamo. Getting out of bed, he'd put his foot upon it and felt its cold hardness wriggle away from beneath him. Filled with revulsion, he'd whipped his foot back into bed "just as another cockroach scuttled toward him." Burman did not tell that agitated complainant how near he had come to losing his foot.

Thirty more reports rolled in next day. A score of houses had been entered and four shops robbed by things that had the agility and furtiveness of rats—except that they emitted tiny ticks and buzzing noises. One was seen racing along the road by a homing railway worker. He tried to pick it up, lost his forefinger and thumb, stood nursing the stumps until an ambu-

lance rushed him away.

Rare metals and fine parts were the prey of these ticking marauders. I couldn't see how Burman or anyone else could wipe them out once and for all, but he did it. He did it by baiting them like rats. I went around with him, helping him on the job, while he consulted a map.

"Every report," said Burman, "leads to this street. An alarm clock that suddenly sounded was abandoned near here. Two automobiles were robbed of small parts near here. Shuttles have been seen going to or from this area. Five cats were dealt with practically on this spot. Every other incident has taken place within easy reach."

"Which means," I guessed, "that the queen is somewhere near this point?"

"Yes." He stared up and down the quiet, empty street over which the crescent moon shed a sickly light. It was two o'clock in the morning. "We'll settle this matter pretty soon!"

He attached the end of a reel of firm cotton to a small piece of silver chain, nailed the reel to the wall, dropped the chain on the concrete. I did the same with the movement of a broken watch. We distributed several small cogs, a few clock wheels, several camera fitments, some small, tangled bunches of copper wire, and other attractive oddments.

Three hours later, we returned accompanied by the police. They had mallets and hammers with them. All of us were wearing steel leg-and-foot shields knocked up at short notice by a handy sheet-metal worker.

The bait had been taken! Several cotton strands had broken after being unreeled a short distance, but others were intact. All of them either led to or pointed to a steel grating leading to a cellar below an abandoned warehouse. Looking down, we could see a few telltale strands running through the window frame beneath.

Burman said, "Now!" and we went in with a rush. Rusty locks snapped, rotten doors collapsed, we poured through the warehouse and into the cellar.

There was a small, coffin-shaped thing against one wall, a thing that ticked steadily away while its lenses stared at us with ghastly lack of emotion. It was very similar to the Robot Mother, but only a quarter of the size. In the light of a police torch, it was a brooding, ominous thing of dreadful significance. Around it, an active clan swarmed over the floor, buzzing and ticking in metallic fury.

Amid angry whirs and the crack of snapping scalpels on steel, we waded headlong through the lot. Burman reached the coffin first, crushing it with one mighty blow of his twelve-pound hammer, then bashing it to utter ruin with a rapid succession of blows. He finished exhausted. The daughter of the Robot Mother was no more, nor did her alien tribe move or stir.

Sitting down on a rickety wooden case, Burman mopped his brow and said, "Thank heavens that's done!"

Tick-tick-tick!

He shot up, snatched his hammer, a wild look in his eyes.

"Only my watch," apologized one of the policemen. "It's a cheap one, and it makes a hell of a noise." He pulled it out to show the worried Burman.

"Tick! tick!" said the watch, with mechanical aplomb.

THE END.

IN TIMES TO COME

COMING up next month is Part Two of "Sixth Column," of course, but we hasten to point out that this yarn is one of those that gathers momentum as it rolls. You'll enjoy Major Whitey Ardmore, U. S. A., complete with long white beard, long white hair, long white robes, *and* a genu-wine shining halo flickering about his patriarchic sconce. Also, the possibilities Anson MacDonald suggests for a first-class advertising man turned loose with unlimited gadgets on the Pan-Asian lack of imagination makes nice reading.

Coming, too, is Nelson S. Bond's first long novelette in a long time—"Magic City." Bond has a remarkable diversity of styles; his short this issue is totally different from the strong and sympathetic telling of "Magic City" and of the adventures of two in a world that has forgotten civilization.

Among the shorts, Robert Heinlein's back with one of the screwiest little pieces in a long time. Heinlein, during his naval work, specialized in mathematics. The navy has a lot of use for that study; it's a bit of a tricky problem figuring out in advance where a shell will land. Heinlein's relaxation seems to have been working out three-dimensional pictures of four-dimensional bodies and calculating their actual physical properties. Some of them are very surprising as well as confusing, but most of them help make "—And He Built a Crooked House" remarkable. An architect who thought a three-dimensional model of a four-dimensional cube would make a striking modernistic house starts things, though the earthquake that made it all too real helped—

THE EDITOR.

ANALYTICAL LABORATORY

The readers' reactions to the November issue—containing the third installment of "Slan"—indicate that our belief that "Slan" gained as it went was correct. Briefly, things stood thus:

	Story	*Author*	*Points*
1.	Slan	A. E. van Vogt	1.24
2.	Salvage	Vic Phillips	2.45
3.	The Exalted	L. Sprague de Camp	2.78
4.	One Was Stubborn	René La Fayette	3.33
5.	Sunspot Purge	Clifford D. Simak	4.5

For explanation of how the point-scores are calculated, see last month's Lab.

THE EDITOR.

THE TRAITOR

By Kurt von Rachen

If you need equipment badly enough, you can usually make your enemy donate it—if you're sharp enough!

Illustrated by Schneeman

THE sparkling light came through the dull murk of the afternoon like an ancient airway beacon of far-off Earth. And because he had been convinced until that moment that his party was the only humanity on Sereon of Sirius, Steve Gailbraith stopped his stalking of heavily furred cattle and stared.

Blink-blink, blink, blink-blink, blinkblinkblink— It was no code, that he knew, and yet it was not regular enough to be a navigational guide.

Ex-colonel of an air force, which had been out of existence since the successful revolt of Earth, Steve Gailbraith's instincts ran to the military. He saw that they were on a wide, uneven plain, the dun expanse of which offered little cover. If an intelligent hand were guiding that signal, helio or whatever, then it was plainly meant to call to him and his hunters.

Steve raised his clenched fist over his head and signaled the time-honored rally and then waited while his men and Vicky Stalton came up. One by one they abandoned their intent upon the strange cattle and closed upon him.

Vicky, who had been nearest, was first. She bore little resemblance to her portrait which had been posted over Earth as an inspiration to the revolt. The "Flame of Liberty" girl was still blond and beautiful, but her idealistic uniform was in shreds and half the bill of her little soldier's cap had been ripped away. Disillusionment was still written upon her for she had trusted the leaders of the People's Party, had idealized them and had been cast out for fear that her brilliance as a propagandist would boomerang.

"What's up? We haven't begun to get our meat quota for today."

Steve pointed and she became very quiet. The others stared at the blinking dot on the rocky pinnacle and then looked to Steve. They were ragged tatterdemalions, part of Blacker's longshoremen, detailed to help Steve get game. One more came up, a scientist of Jean Mauchard's contingent—distrusted intensely by the longshoremen—young enough to see adventure in being thrust bodily from Earth and abandoned in space, exiled under the guise of "expedition."

"Somebody signaling us," said the young geologist.

"With good intentions, I hope," said Steve.

He led off, Vicky Stalton trying to match his long stride. She became a little afraid of him—if she ever became afraid of anything—when his face grew still and his shoulders square, but she was, at the same time, glad of him.

At a swift pace they approached the base of the pinnacle but even

The Fury settled slowly toward his smoke signals. They were very evidently suspicious even of a single man—

here they could tell no more about the light for it was still focused upon them and still blinking. The great double star of Sirius shed little warmth upon this place but all of them were puffing and overheated and they paused for a short rest. Two of the longshoremen were lag-

gardly in coming up; their complexions were greenish for they evidently had a touch of the strange fever which had reached into the expedition to take away three members and lay out many more.

"Haven't the slightest idea of that code, have you?" said the geologist.

"It isn't regular enough for a code," said Steve. "It's trying to attract our attention and is guiding us in." He was a little snappish for he, too, felt weary and hot of brow. "Let's go on up."

THEY CLIMBED the shale, set back by its sliding almost as much as they ascended, until, worn and blowing, they rounded a last boulder and were confronted—and almost blinded—by the signal.

There wasn't anyone in sight, or any sign that anyone had been there. Steve, shielding his eyes, advanced to the thing and got under it. It was like a wheel, some three feet in circumference, and it had wind vanes on it. Dangling from it at various angles of slant were disks. When the wind turned it, the variant angles of reflection would make it visible for miles.

"Very strange," said the geologist. "Why do you know this is built of iridanium! Chunks of rocket lining mounted on an astral compass bearing. Why this might have been here for centuries. Look! Iridanium was not supposed to wear and yet this shows considerable corrosion. How odd!"

Steve scratched around the base and found that the spindle was set in solid rock and that the set had been overlaid by years and years of dust. In fact the thing was almost ready to fall. At risk of his fingernails he cleared the pedestal entirely and then the edge around it to finally discover the corner of a slab. He wrested this from the ground and blew upon it to clear away the dust from a series of indentations which seemed to be writing.

"Why that's English!" cried the geologist.

"He can read too," said Vicky. "What's it say, Steve?"

"If I remember my ancient calendars, this was written about five hundred years ago," said Steve. "It says: 'If relief ever comes: know that the green fever has taken the entire colony and may soon take me as well. If this is ever read by anyone, please carry back word to Earth that I hope the people who formed this company and then left it to rot sizzle in hell. Confusion to the enemy. Bill Moran.' "

They were silent then for a long while. That message out of the ancient first days of space travel, struck all too close to their own case. For they had been left to rot. Too powerful politically, Jean Mauchard head of the Sons of Science and Dave Blacker, fire-spewing chief of a longshoreman shock battalion had been "sent" on this expedition to Sereon. And because each thought itself betrayed by the other, the two contingents had been expected to wipe each other out. Steve Gailbraith—who had shown too much tenderness toward aristocrats in California—had been the one inclusion which had, so far, kept things even, though no one realized it save Vicky Stalton.

One of the longshoremen of the hunting party, a twisted runt, looked glassily at Steve. "Th . . . the green fever! It killed them! All of them!"

"Yeah," said Steve.

"Then it can't be cured. Then you scientists have been lyin' to us!"

The geologist, having nothing to do with it and having no conscious fault, dodged the hurled rock and

then dived to safety behind Steve, trying to swing up his black stick in case this went further. Morry Durand, an electrical engineer, had already been killed, some said, by these longshoremen; at least his brains had been battered out of his skull and though the wolves had been at him, wolves don't bash in men's brains.

"Steady," said Steve. "By the look of your face, Midget, you'll be dead before you really have to start worrying about it."

The longshoremen stared at Steve and then at Midget, the runt. The remark had its desired effect. They wanted no fight.

"Let's get back to camp," said Steve.

IN THE HARSH brilliance of the light haze which filled the central dome of the camp, Steve communicated his news to Jean Mauchard.

Mauchard was a severe ascetic, lean to a skull, with no sympathy for anyone who did not share his gods —the test tube and the electrode. In particular he despised the ignorant if forceful braggart, Dave Blacker.

"This is very interesting," said Mauchard. "Surprising that they knew how to cut iridanium so long ago."

Steve had been doing the talking and now he had turned his attention to a steak. The mouthful paused halfway to his lips and he stared, aghast at the realization that his tale had found no tender spot in Mauchard.

"Fagar must have known about that expedition," said Steve. "He has access to the Astrographic Office files and all expeditions are listed there."

"What do you mean?" said Mauchard.

"I know why that expedition was never picked up," said Steve. And he pointed through the crystal sheen of the dome toward the outer dome where half a dozen green-hued men lay gasping. "They knew about green fever. Fagar knew about green fever. He sent you and Blacker here because he knew you hated each other and would probably wipe each other out. He didn't dare execute us to a man and so he sent us to a place where, if the petty hatred didn't get us, the green fever would."

"You sound surprised," said Mauchard. "I realized that several days ago."

"If you did, then why did you pick this last fight with Blacker, just when this thirty-day truce was to be renewed?"

"His men killed Durand."

"You have no proof of that."

"I have my ideas and I'll thank you, *Colonel* Gailbraith, not to intrude yours upon them."

Steve put the plate away from him. "Listen to me, Mauchard. You were put here to die. Doesn't that arouse any fight in you? Haven't you a good, strong impulse to whip Fagar at his own game?"

"If I have, it will do me no good. Fagar is Dictator of the Empire of Earth and we . . . well—"

"So you just sit idle here and let his plan wreck you. What have you done to stop this green fever?"

"We have done all we can do. We have found that it is not bacteriological but chemical, probably caused by some additional ingredient in the atmosphere or the water which we shall shortly isolate—"

"You've been trying to isolate it for thirty days and you haven't succeeded. That means that we'll all be dead by the time your lads finally squint into the end of a tube and say 'Ah! Isn't that amazing!' And

right now you are breeding another war with Blacker to split up this camp."

"I am not!"

"I saw Blacker before I saw you. I saw him when I came in and he asked me where a good spot for another camp could be found."

"Let him go. We don't need him now."

"And he doesn't need you unless you get a cure for green fever. Mauchard, I've been very gentle—"

"A failing with you, I know," said Mauchard sarcastically touching upon his hatred for the barbaristic arts of war and soldiers in general.

"But I'm through."

"Do tell. I think the men who were with you can kill all the game we want. I suppose you are going to run down to Chicago for tea and sulk."

"Are you going to be civil," said Steve, "or shall I roast off an ear?"

Mauchard, seeing Steve's hand tense near his heat gun, became civil. "What do you propose?"

"I propose to take over command of both groups. Neither of you trust me but at the same time you each hate me less than one another. If I am in command, I shall work for the common good."

Mauchard's laughter was soundless.

Steve got up. "All right, laugh! But if you think I'm going to lie around here and rot, you've a broken switch under your scalp."

He went into the outer dome, past the individual cubicles where the longshoremen and their families lived. He saw a withered wreck of a woman trying to quiet a screaming child whose face was already marked with the hue of fever.

He felt suffocated in this central-heated village and strode toward the main entrance. Outside three moons, two a greenish blue and dull and one a bright orange and not much bigger than a fist, bathed the rolling plain in gruesome light.

A KNOT of men stood about something on the ground by the river's edge and Steve wandered toward them.

It was Blacker, an incongruous hulk, corpse-eyed, his checkered topcoat pressed back against his legs by the wind. He was standing over a dead man. Across the cadaver from him were three of his henchmen.

"What if he did kill Durand," snarled a longshoreman, "he didn't do it like this!"

Steve paid little attention to Blacker's half-hearted attempt to prevent instantaneous violence. Steve rolled the body over with his foot and saw that it had systematically been seared from knees to eyes by a pressure stream of a violent acid. He released his foot and the thing flopped back into the mud on its face.

"But only them scientists could do such a thing! It's them that's tryin' to get us. Maybe they even let loose the green fever on us. I don't notice any of them getting it."

"Cornolt has it," corrected Steve. "What's this going to be, Blacker? Another break?"

"Shut up," said Blacker. "When I need your advice I'll send for you."

"Then you'll have to send a long way," said Steve.

But they were too heated about the murder to read anything into his remark. Steve walked along beside the river and was aware, after a little, of another with him.

Vicky Stalton had followed him at some distance. She had found something astonishing about him with regard to herself: she could feel his moods as clearly as though they

were her own. She wished she could read his thoughts as clearly. Devious and unpredictable, Steve Gailbraith's dismissal from Fagar's forces had been, whether Fagar knew it or not, a definite loss. A man who, before thirty, has taken over the government of a State and has built himself into a model for all revolutionary youth—well, perhaps Fagar was not too stupid in ridding himself of such a potential menace.

"There's trouble," said Steve, almost talking to himself.

"There's been trouble around me since I was fished out of a garbage can at the age of one," said Vicky.

He stopped and looked fixedly at her. "Are you in favor of staying here and rotting?"

"Not I, my good friend."

"And no matter what I do, you'll give me a hand?"

"Well— All right. I'm just as much an outcast as you are, even in this company. If I'm not mistaken, you've already pulled two fast ones and if my nerves can stand it, why I'll trail along for a third."

"That's a pale answer," said Steve.

"I said I'd stick, didn't I?"

"Yeah."

"Well, I meant it."

Steve looked at her for a moment and seemed about to add something but he did not. He turned and went up the hill toward the glowing dome of the village.

THERE WAS some excitement at the entrance but Steve did not bother to ascertain what had happened for he knew that there would be much talk and many threats before the matter came to battle. The folly of the bickering was so clear to him that he had even ascended the annoyance of it to a point where he gazed down with detached contempt.

He passed Mauchard who was going out at the summons of a scientist to argue the matter with Blacker, and Mauchard did not even see him.

Steve turned down a hard-packed corridor and came to a stop before a door marked "Communication." Mauchard's men, clever with nearly every branch of endeavor except diplomacy, had thrown together a few bulbs and coils and transformers to make an astrophone. Their intention had been to plead for help and to find any data available on green fever, but with all stations so closely controlled by government and because that government was so anxious to hear the last of them, their pleas had gone in vain—and nobody knew anything about green fever, which fact was probably true.

Steve entered. An electrical engineer was sitting with his back to the set winding a new coil and scowling. He looked up at Steve and the scowl deepened.

"Looking for somebody?" said the engineer.

"For you," said Steve. "I want to send a message."

"You? Send a message? If you got authority from Jean—"

"I haven't. My only authority is this. Don't move."

The engineer stared at the muzzle of the heat gun and then hopelessly at the door. "You won't get anything that way."

"Sit over there against the wall," said Steve.

"If I don't?"

"Why then I'll have to kill you and that would be a pity."

"Hell of a lot of good it will do you to send a message," replied the engineer, taking the designated position.

Steve sat down at the panel and pulled the switch into place. There was a distant hum and the lights faded for a moment until the load was equalized. He knew the call

wave for Earth and saw that the ion-beam was already set on it. The screen flickered nervously and then, after a short lapse, glowed brilliantly and was filled with the image of an operator.

"This is Gailbraith on Sereon. I want to speak to Fagar personally."

The operator grinned. "Sorry. Nobody is allowed to do that, much less anybody in Sereon."

"Take your job in your hands if you want," said Steve. "If my news does not reach Fagar—"

"I'll take it down."

"Get me Fagar."

"Sorry, I can't do that."

"If he cares anything about space pirates—"

"What?"

"Space pirates."

"I'll let you speak to a sergeant at Astral Police."

"I'll compromise for a captain in the navy department."

"I'm not supposed to do this."

Steve watched the screen fade out and then, shortly, blink on again with the image of a disheveled individual who had evidently been having a quiet nap.

"This is Gailbraith on Sereon."

"Gailbraith? Never heard of you."

"Colonel Gailbraith."

"Oh! Hey, wait a minute. We're not supposed—"

"I know about that. But I've got news. Listen closely. About five hundred years ago there was an expedition to this place."

"I don't know about that, but go ahead."

"Its gear was stored in coroproof vaults and Mauchard and his men found it. There was a scout cruiser there almost completed and in spite of its design Mauchard had enough extra equipment to bring it up to date. The thing will be finished in about three weeks. I've got a belly full of both Mauchard and Blacker and so I'm giving you the information that they've reached an agreement to leave this place and attack shipping closer in to the System."

"What the devil . . . a scout cruiser?"

"Armed with blasters of Mauchard's own invention. If the thing is finished, it will take half the navy half a lifetime to catch it. If you want to prevent it, send the nearest war rocket you've got to blast this camp out of existence."

"The *Fury* is cruising about four days away from you," said the captain, hastily consulting a chart. "A scout cruiser . . . powerful guns— What do you want out of this?"

"I'll be about five miles north of this camp on a small hill. If I am picked up there, as the *Fury* comes in, I can direct it to the place where the scout cruiser is building and so let them destroy it before adequate defense can be placed."

"Five miles north . . . small hill— All right. Anything else?"

"Tell them that the green fever is not bacteriological but chemical and so is not contagious. Otherwise they'll have no liking for the job."

"I guess if Mauchard can't stop it, it must be chemical," said the captain. "All right, Colonel Gailbraith. I'll put this through the proper channels immediately."

THE SCREEN blanked out and Steve cut the switch. He turned to the place the radio engineer had been but the fellow was gone!

The door crashed inward and Mauchard stood there, flanked by both his own men and Blacker. They were armed.

"What the devil do you mean, sir?" said Mauchard.

"I mean I'm sick of the lot of you!"

said Steve. "Sick of your stupidity and your bickering and your eagerness to wipe us all out. I've no love lost for any of you and I'm damned if I'll die just because you hate each other!"

"On the strength of that lie," raged Mauchard, "they'll wipe us out in spite of anything we can say!"

"Why not?" said Steve. "It's better to be dead at the muzzles of flash-cannon than to die slowly from green fever!"

"Yeah. Sure," said Dave Blacker. "Talk yourself hoarse, bucko, but that ain't covering up that you're a damned spy. If we didn't wipe ourselves out, you were here to make sure Fagar knew about it. And now on a cooked-up charge . . . I got a good idea of what to do with a spy!"

One of Blacker's men enthusiastically clipped down on the trigger of his blastick but he was no soldier. Before he could complete the motion Steve's heat gun made a frying sound and the man's face and shoulders were charcoal and then nothing. The others had been slightly behind him and the sickening smoke blinded them for an instant. Steve's boot slammed the door shut and he triggered the lock, fusing it to the jamb.

He poised in the center of the room for a moment and then seized a chair to launch himself into the ventilator shaft which led from the cubicle up to the top of the outer dome. It was just large enough to let him get a purchase with back and knees and so hitch himself upward. He smashed the heat blocks with the butt of his gun and dropped them out of his way. It was about forty feet to the top of the dome from this portion of the village but he had to go an inch at a time, and it seemed like forty miles.

Behind him he could hear them shouting as they brought up a torch and then an updraft brought him a breath of choking ozone and metal gas. Straight up he could see one of the three moons, dispassionately looking down upon him.

The shouts were louder below and then suddenly still. They had broken through the door and for an instant wondered what had happened to him. Then they were shouting again for they had seen the torn heatblocks below the ventilator.

Steve's fingers reached the upper rim and he swiftly raised himself, at any moment expecting to feel the scorch of a blastick from below. He threw himself out flat on the dome just as a geyser of flame spouted through the hole and lit the night like a pyrotechnic display. The shouting below stopped and he realized what an excellent target he made on this smooth dome; and within a space of seconds they would be outside, spotting him with beams.

He slid over the surface, wondering if he dared slide down the curve of the dome and drop the thirty-foot vertical at its edges. His arm went down into another ventilator hole. He slid himself over and into it and found that it was slanting at a gentle angle.

From outside the dome came renewed shouting and then the fingers of beams, brilliant in the night mist, locked and interlocked above the ventilator.

Steve dropped the last ten feet into the room and found that it was a longshoreman's billet. Two women emitted startled screams at his appearance, screams which were lost in the furor in the corridors.

"Quick!" said Steve. "Which way did he go?"

They gaped at him.

"Don't stand there blinking! I followed him down that ventilator. You're hiding him!"

"No, no, no!" protested the younger one, senselessly resorting to tears.

"He must have taken the other turn," said Steve, hurrying to the door. "If you see him, howl for the nearest guard!" And he ducked into the corridor.

IT WAS dark here, the only light streaming from the grates of the cubicles. Several men had just dashed by, heading for the outside, and Steve swiftly came up on their heels to speed along with them though unknown to them. When they came to a turn Steve suddenly seized the rearmost member across the mouth and about the throat and slammed his head into the solid wall. The fellow slumped and Steve yanked off the revolutionary great-cape which the man wore in common with most of the longshoremen. Hauling this about himself Steve stepped over the inert body and hurried after the fellow's mates.

They arrived at the entrance in a burst of sound. Outside everyone was yelling and running and staring at the dome. Steve clung close to his party.

"It's that damned soldier!" yelped somebody. "He shot Svenkle!"

"Some of you cover the other side. There are only ten men around there!"

"I see him!"

"That's the antenna, you half-wit!"

Steve's heart was hammering loudly for he saw now how close he had come to missing a trick. The outer dome had an acid-filled ditch about it and he had considered sliding down it!

"There he is!" bawled Steve, pointing.

Everyone looked.

"Right up on top! Lying flat!" cried Steve.

Everyone stared at the top.

"Here!" and Steve yanked away the blastick of a guard and blazed furiously at the top of the dome. That started at least a dozen guns going and for the next five seconds the whole group was light-blind from the fire. And when they could see again the fellow who had started it was gone. Not that anybody noticed he was gone, though one man was heatedly demanding the return of his bandoleer.

"I see him!" yelled somebody. "Behind the solarmotor!"

And they were at it again.

BY DAY Steve lay in thick grass and watched them search for him across the illimitable monotony of the plains. By night he sat in rings of fire and amused himself by throwing brands at the encroaching, hopeful wolflike beasts. He was in repose as is a grenade which, having its dial set, sits quietly for a space ere it blows up the pillbox.

He was rather amused at himself and life—a bitter sort of amusement. Until less than a year ago he had been the perfect, gawp-jawed idealist, ready to do or die for a cause and glory. And when he had discovered how viciously stupid mankind in the rough can be, how his golden deeds had been less than cheap brass, how his gods had all become clods, he had let it break him. It was galling to remember that he had been broken. If it had not been for Vicky Stalton—

By day he lay in the deep grass of knolls and watched them try to keep up the meat supply which he had started and maintained. How crude they were in their stalking—but then he had no right to laugh for until this time he had only

stalked men. Had they tried to preserve any of the bounteous supply he had brought in to them? No, they were buckling their belts tighter and starting the game before it was within howitzer shot.

If it had not been for Vicky Stalton, he might have let it whip him. What a funny kid she was; how scared of appearing scared. She had a block of wood on her shoulder so light that a breeze could blow it away. What did caste matter now? Most of the aristocrats were dead, most of the military caste were buried without honors. She had come from the tenements, but what of that. She had an agile brain and a strange kind of beauty and she'd boosted herself so high that even her own kind was afraid of her. She was still in a daze after the shocks of the past two years of battle and betrayal. What couldn't she do when she finally came around to trusting a friend?

And then, on the afternoon of the third day, when he had despaired of seeing her at all, his keen sight singled her slight form from a group of searcher-hunters.

Steve slid backward from the mound, seeing that they would pass by a certain gully on their way toward some long-furred cattle. He crouched in the water-carved gash and waited with patience. After a little the ragamuffins spread out in a crude, bungling attempt to half-moon the herd and Vicky was left at a point, closing in alone. Steve, running half-crouched, came as close to her as the gully would permit. Then he edged over and on hands and knees went through the long, dun grass.

He almost received a blastick cartridge in the face when she sighted him, so certain was she at first that he was a beast of prey.

"Vicky!"

THE BLASTICK trembled and drooped and Vicky's eyes were suddenly moist. But she kept her head and casually sat down on a rock while Steve approached to within touching distance of her boots.

"I ought to sing out and let them know you're here," she said in an attempt at coldness.

"You won't," said Steve. "How are you?"

"Not dead . . . yet. You?"

"Living on the cream of the land."

She almost laughed at him for he was gaunt and ragged and dirty—about as far from the immaculate officer he had once been as a core miner is from an interne.

"What are they doing in camp?"

"Fortifying the place, of course. They've put a zone of force around it to a distance of a quarter of a mile—as if that would stand up against anything but infantry. You've put us in a terrible state of nerves. If they caught you, they'd lightly heat-cure your hide—on you."

"No doubt. Are you coming with me?"

"Why should I?"

"To save your neck."

"As a traitor, my neck isn't valuable, even to myself."

"But you're liable to get killed in the village."

"Everybody's got to die sometime."

"You feel pretty bitter about what I did, don't you?"

"Well," said Vicky, "it was a good, cheap way to save your own health . . . maybe. But don't you think that putting your own value at four hundred lives was a bit optimistic?"

"Once," said Steve, "I thought you were bright. The People's Party got rid of you because you were too in-

telligent. Why not show me a sample?"

"You were the only one that could have pulled them together back in the village," said Vicky. "But you chose to throw them all into a grave the old *Fury* is going to dig for them. If I went with you, maybe I'd find myself being used as a stepping stone. No thanks, Colonel Steve."

"So I'm a traitor, eh?"

"You turned coat on the air force and joined the rebs. Course half the force did that but still— You made peace with the aristocrats in California when you made yourself governor there. Course it was silly to follow orders and roast them all. You went on an expedition to Sereon and turned your coat again by handing a lie to Fagar—"

"I was wrong," said Steve. "They kicked you out of the People's Party because you're just a stupid wench!"

"I wear the same colors straight through," said Vicky. "That's probably stupid, but I'm built that way. If you don't get away from me now, before I count ten, I'll call the rest of the party down on you. And how they'd love it! One . . . two—"

He lay there for a short space, looking inquiringly at her so that she had to slow her count and give him time to get away. But after a little he departed, sad-faced and concerned.

"If you get knocked off in this scrap," he said with some heat, "then don't blame me."

"Ten," said Vicky. But she didn't call the party together or say a single word about having seen him. "The rotter," she snarled to herself angrily.

THE *Fury* was a sparkle and flash in the greenish sky, swooping down to coast within three miles of the ground and then hang there above the plane on the invisible stilts of antigravitators.

Steve had his fire going on the hill five miles north of the camp and now, seeing that the relief force had arrived, he piled wet grass upon the blaze and smothered the whole with the revolutionary great cape, also wet. He lifted the cape, replaced it, lifted it, replaced it, repeating the motion until plumed dots and dashes, spelling the Statter Intersystem Code symbols, hung on the windless day.

"G-A-I-L-B-R-A-I-T-H," said the smoke. And then, "CX-D-A-LN-F-FR-INX-X." Which, in SIC, read out: "Cruiser hidden. Advise your landing for further information here." And then so that there would be no confusion, he repeated it twice.

The *Fury* seemed reluctant, staying over the horizon from the village. But at last dark cartridges, fed with proper spacing into a small caliber autoflash, dropped their sheets of ink in a horizontal banner which spelled, "IS-ENF-MDD" or, "Is enemy force armed."

"Brave, brave lads these new P. R. P. officers," Steve told himself, building up his fire anew. Then he sent up more smoke. "SA-NX-GG" or, "Blasticks but no higher attack means."

The *Fury's* tubes sprayed a short stutter of flame and then it eased down to a landing on the mound. Ladders fell out of her plates and connected with the ground and ten alert marines swarmed, bounced to the grass and advanced on Steve, their sergeant scanning the place for any traps.

"Captain wants to see you, sir," said the sergeant. He grinned a furtive welcome for he remembered the way Steve had taken blasticks away from them and the gag had appealed to him. The "sir" came involun-

tarily for the sergeant had served in the navy and he knew he addressed an officer. He had been on the haphazardly commanded *Fury* long enough to begin to yearn for the good old days when orders was orders and officers was officers and not ex-privates and seamen that'd got gold-braid-blind all of a sudden and to hell with 'em.

"I've been expecting you since dawn," said Steve.

"We been tryin' to find Sereon for two days," groused the sergeant with a cautious glance over his shoulder. "Memorizin' party rules ain't no help to a man's navigation at all! Wouldn't 'a' found it now if the navigator hadn't shot the truck light by mistake."

"Carry on, sergeant," smiled Steve and strode off toward the gangway.

At the top a scowling mass of mankind by the name of Lars Tavish was waiting for him. Lars was political leader of the *Fury* and a special representative of Fagar.

"What's this all about?" challenged Lars, annoyed that Steve had inspired the orders which had yanked them off comfortable, if wild, Space Station 52A67 Sirius.

"If the captain is around—"

"I'm handling this."

"It's warfare," said Steve, "not politics. The captain, please."

"Oh, a book soldier!" But Lars let him pass up the companionway and head for the bridge.

THE CAPTAIN, an ex-petty officer, was very doubtful of the whole thing. Doubtful of Steve, of Sereon, of the Expedition and, mainly, of his own ability. He was all set to bluster and bray but he had a malady known as officer-habit and his small eyes sought the floor and his speech was jerky.

"Well, well? Well, well, well????? What's this all about? What's this all about?"

"I was uncovered sending the information to Fagar and had to fight my way out of the place," said Steve, not so anxious to relate the incident as to forget to take a cigarette from the desk and light it gratefully.

"Well? Well, well???? My orders said something about a scout cruiser, pirates. A scout cruiser and pirates. Well? Well, well?????"

"They found the remains of an expedition that was here before. There was a cruiser there which lacked only a few repairs. And so the plan is for them to fix it up and put out to space and get revenge on Fagar by knocking the devil out of his shipping."

"Ah! Pirates. Got to stop this piracy. Got bad during the revolt. Got to stop it. Half the vessels of the navy were made into pirate ships. Got to stop it. Where is it?"

"That," said Steve, "is something I knew a few days ago but know no longer. When they caught me phoning Fagar they moved the ship. They've got it hidden somewhere, and this is a pretty big planet."

"Humph! Harumph. Ah, hum!" And the captain was wondering very desperately what one did next. C. P. O.'s in the old navy, hadn't ever been taught much strategy or method of procedure. He'd meant to study up, of course; but—

"My suggestion would be to attack the village with my full landing forces and secure prisoners. And then use a little burning grass between the toes to make them disclose the whereabouts of the cruiser and the men who were to man it when it was finished."

"Cruiser crew not in camp, eh?" said the captain nervously.

"The cruiser won't be in fighting condition for a month at least. If you get a few prisoners from the village, they'll talk. A little burning grass between the toes—"

"Yes, yes indeed! My very thought that. Yes indeed. Harumph. Landing force, capture a few prisoners. Of course. Correct procedure. Think I don't know procedure?"

"Of course. Every able officer does. I was merely telling you how the land lay and you'd know what to do about the rest of it."

"Oh naturally, naturally. Of course, of course. Indeed yes."

The marine sergeant and a guard were there in the doorway, ordered to stand by in case Steve tried anything. But Steve was so evidently sincere and the project so simplified that the captain, glad to be appreciated for a change—by an ex-officer of all things—issued his orders.

"Sergeant, bring Lieutenant Gonagle here."

ABOUT two hours later the landing force, fully equipped, was slogging the five miles to the village, towing some small fieldblazers with them. They were under the command of one Lieutenant Gonagle and their line of march looked more like a demobilized regiment than a battle force.

"Fine body of troops," said Steve. "Wonderful what individualism will do for an army."

He and the captain and four other officers were standing on the *Fury's* bridge near the control panels. All turrets were trained on the village.

"Yes, yes, of course," said the captain, hoping guiltily that Steve wouldn't find out about last week when the crew suddenly voted to go to Station 52A67 Sirius and get drunk. "Yes, yes, of course!!" He changed the subject. "We had no idea that you were an agent until we received orders direct from the

navy department which included your name. I hope . . . erah . . . we weren't too rough on you coming out here."

Lars had entered the bridge a moment before and on this remark he stopped, thrusting his conical skull forward pugnaciously. "Agent? Him?"

"Why yes, of course," said the captain. "The despatches—"

"He's no better than Mauchard or Blacker!" said Lars Tavish. "He was sent up here just like they were to get what was coming to a traitor."

"My dear fellow," said Steve, "you have reminded me to ask to see your papers. There has been a little trouble with impersonations in the service the past few months—"

Lars made a sound which was half snarl, half roar. "My papers? You ask me for my papers? MY papers? Do you claim you've got authority to inspect the papers of a special representative of Fagar?"

"Well?" said Steve crisply. "Where are they? It won't do you any good to bluster, my man."

"No good at all," echoed the captain whose life had been made one long argument by this Lars Tavish's authority. "No good at all."

Lars would have said something but he could think of no words which would tear Steve apart with enough violence. He was a pitiful picture for he shook from head to boot with pent ferocity and seemed in danger of a fit.

"The papers," insisted Steve.

"Yes, yes. The papers!" said the captain.

Lars whipped them out and threw them at the captain with such strength that they almost knocked that sturdy lump of humanity flat. But the captain lethargically broke the band and began to open them. They seemed perfectly all right to him.

"Forged," said Steve. "Yes, just as I thought. Forged. Gentlemen," he said to the others above Lars' howl, "please inspect these papers and verify what I say. Forged. See the blur of the seal? And those fingerprints . . . well, look for yourselves." He indolently stepped back against a fire-gun mount to let them peer over the captain's shoulders. They were not unintelligent men but the habit of obedience to the military caste was strong in them and they now briefly sought to find something wrong.

Lars was rattling with rage and he leaped upon the captain to tear the papers from his grasp and show them that they were all in order. "See?" he screamed, his voice nearly cracking. "See? There they are. There's Fagar's signature! So I'm not Lars Tavish! So I have no authority!" And he cast the papers away into their faces and whipped about, hand going to his heat gun to make atoms out of Steve. But there was only one thing wrong with that: a sizzling hiss.

THE fire gun against which Steve had so carelessly leaned had unaccountably swiveled around to point inboard with Steve's hands curled about its crossbars. The fire from it made Lars Tavish's hat smoke. But Lars was too far gone in anger to be warned. He dropped flat on the plates and triggered his heat gun. A path of whiteness charred him and sent him skittering along the plates. The captain and the four officers stood in appalled astonishment a second too long. An arc of blazing fury made a vertical ring around them and they dodged back with upflung hands. The arc ceased.

Steve patted out the smoldering

embers which Lars' weapon had implanted in his shoulder. His face was pale but his voice was steady.

"Keep away from the phones, there," he said. "Walk over to the far bulkhead and stand there with your faces to it."

"This . . . this is m-m-mutiny!" said the captain.

"Impossible," said Steve, "since I never was on your side. Not since I was sent out here to get killed off anyway. Treason for treason, gentlemen." And now that they had taken their station, face to bulkhead, he advanced, heat gun in hand, to throw loops of gun cable about them and cinch it tight. They had the corpse of Tavish in plain sight and so made no effort to protest.

Steve went to the control panel. The televise showed the landing party outside the zone of force of the village and setting up field blazers. Shortly the field blazers were firing—and their charges arcing off, deflected by the zone of force. Lieutenant Gonagle watched this action for a little while and then decided to send for reserves.

Making his voice hoarse, Steve promised them and then, through the speakers, emptied the ship of every man fit for action. This force, lugging more field blazers, went loping to Gonagle's aid and, in about an hour, had completed the encirclement of the village force field. An old officer of the technical corps would have moved up the *Fury* herself and squashed the force zone with antimagnetizers, wrecking the enemy generating equipment by robbing them. But no technical officers were there, the *Fury's* lone adviser lying trussed on her bridge.

Steve carefully regulated his sights. He could not hope to hold this ship or the bridge alone for he could only man a small gun by himself. And so he had to have recourse to his wits again.

He contacted the engine room and got a cone beam. From the bridge he spotted this beam as accurately as he could. He set it for a diameter of three quarters of a mile and pivoted it on the force zone of the village, making in effect, two zones, one created by the village, the other by the ship. The space between the zones was a ring some eighth of a mile wide. And the troops in the annular ring between could neither blast their way into it nor out of it.

And then Steve began to call up the remaining units of the ship, one by one, "for personal orders." He was fortunate for he only had to kill one man. The sailors were remarkably reasonable fellows.

TWO DAYS later Steve made a tour of the outer zone. He could not walk through it any more than the landing party could walk out of it. It was quite invisible for its repelling force was sufficient to knock a man down. Through this barricade Steve could see where the village screen flattened the grass and through that, the village. The people there had ceased to worry. Their supplies were not yet gone. It amused the longshoremen to wander up and down the unseen inner fence and act much like people at the zoo, mocking the caged animals.

The harried landing party had tried to dig but, of course, the force zone went down better than a hundred feet and they could not achieve that because of the hardpan at twenty. They had used up considerable of their charges just in trying to keep warm and were now at the end of their second foodless, waterless day, for they had emptied their canteens of wine on the five-mile march to the place and they had eaten their

iron rations months ago. They had now taken to patrolling up and down the walls as though they could find a weak spot. They no longer returned the jeers cast at them.

Steve issued out rations to the men he had jailed and made certain of his generators and passed a quiet night. In the morning he went back to the invisible wall.

Lieutenant Gonagle was anxious to capitulate. He had no thought of terms. He could see the *Fury* and knew there was food there and his politics were no deeper than his stomach. At Steve's orders he caused them to dig a deep hole and plant all their weapons so that it would require an hour or two to get them out again. And then, by means of wig-wag Steve made the surrender clear to Mauchard and Blacker in the village. They shut off their force zone and marched forward to complete the seizure of the landing party. Steve returned to the *Fury* and cut off the outer zone.

THAT NIGHT Mauchard, standing on the *Fury's* bridge and plotting out a course preparatory to a take-off, came near to praise. He grumbled, "Maybe a soldier is good for something after all." And then, a little later: "But, of course, it took a scientist to invent force fields in the first place."

Steve grinned for he could afford to grin. He had the questionable crewmen under lock but he had released some thirty to help man the ship. He had both Blacker and Mauchard overawed—at least for the moment.

But as they left Sereon behind them, his grin was wider. Vicky was changing the bandage on his shoulder and Vicky wasn't looking him in the eye.

"Well?" said Steve at last.

"You're drunk on your luck," said Vicky, trying to be hard about it. "You took California once, so taking the *Fury* is nothing to me, of course. But you're aching for praise and you think I'm going to give it to you. Well—"

"Well?"

"These ex-enlisted officers and a half-soused crew were asking for it. Anybody could have done it with a little nerve."

"Well?"

Vicky looked at him, trying hard to think of something tougher. But all she could think about was how much she wanted to kiss him.

She turned on her heel and stalked away. The man wasn't so clever. Hell no. Didn't even tumble when a blind fool could have seen that a word would have brought her to her knees before him.

"Well?" Hell!

THE END.

STARTING POINT

By Norman R. Goldsmith

We'll agree that rocks don't live, and sponges do. Somewhere in between there's the starting point of life—but where? A science article on the difficulty of drawing the line.

Illustrated by Schneeman

No one argues that a bacillus is not alive any more than one would claim that a dog frisking across the lawn is dead.

The bacillus is small, granted; but when you look at it under a microscope you can actually see it swim rapidly about by means of little whiplike projections—flagellae—all around its body. If you put it in a test tube containing nutritious material, you can prove that it both eats food and eliminates waste products. Finally, if you start with one bacillus, and conditions of food, temperature, and oxygen are right, and inspect it again twenty minutes later—there will be two bacilli. Twenty minutes more and there will be four. At the end of an hour—eight. In other words, the bacillus has the power of reproduction.

Now consider a bottle of sulphuric acid. If you pour it over a drainboard, the liquid will move, though not by its own power. If it acts upon a piece of zinc, it will "eat" the zinc and eliminate water, a process paralleling what goes on in your own body when you eat and digest a piece of roast beef, though you are willing to admit it is not quite the same, even though chemically similar. But of one thing you are sure—you never need to fear the possibility of coming to your reagent shelf sometime and finding that your bottle is now two, or has born a litter of bottlets. You just know it can't reproduce.

Thus, in the absolute final analysis—reproduction is the one quality of living matter which cannot be duplicated readily.

But between the tiny *living* bacillus and the relatively huge *dead* mass of sulphuric acid, there are many other substances with characteristics of life. These living-dead in-between particles apparently comprise a long graded series. They vary in size a good deal more proportionately than do an elephant and a mouse.

Thus they extend from the *Bacillus prodigiosus*—one of the smallest visible bacteria—which is seven hundred fifty millimicrons in diameter—about three one hundred thousandths of an inch—through the rickettsiae at three hundred millimicrons, down to the almost infinitesimal virus of foot and mouth disease at ten millimicrons—four ten millionths of an inch! For comparison, a human red blood cell measures three ten thousandths of an inch.

The functions of these various organisms vary with their size—that is, the smaller they are the less they can do. Bacillus prodigiosus can live by itself as successfully as a larger animal—moving to a degree, seeking and eating the food of its choice. But the virus of foot and mouth dis-

ease has lost almost every power except that of reproduction. The cells of the diseased animal in which it lives have been made to take over practically all the functions of digestion, respiration, and elimination. About all that remains for it is to make more of its own kind. In accomplishing this multiplying, the disease spreads to previously healthy cells.

Here is the common characteristic of all these in-between agents. They must live on some other host. They must live within the actual cells of that host—and for that reason are known as intracellular organisms, or are described as inclusion bodies. Living in such a parasitic manner, their hosts take up most of their normal functions as eating, digestion, elimination, and respiration. All that remains in some instances is reproduction.

Dr. J. Howard Mueller, associate professor of bacteriology at Harvard University, proposed an interesting hypothesis at the Harvard School of Public Health's Symposium on Virus Diseases.

He outlined the following concept, greatly simplified. The more parasitic an organism becomes, the more functions it loses, until none remains except that of reproduction. Paralleling loss of function is decrease in size. If all the complicated chemical mechanism—enzymes, amino acids, proteins—which make up living organism are lost, nothing finally remains but one large highly complex molecule, a molecule of a peculiar nucleoprotein which has the ability to reproduce itself.

So much for the hypothesis. Now let's examine some of these creatures which live in the twilight of life—between the quick and the dead, whose existence depends on an unwilling host and who live completely within the cells of that host.

—the greatest warrior of all—

THE FIRST are the *Rickettsiae*—named after Dr. Howard T. Ricketts, an American bacteriologist, who died in 1910 while studying these organisms which were found in cases of typhus.

Since Hans Zinsser wrote his "Rats, Lice, and History," the average American reader is a good deal more conversant with typhus than many American physicians who have never seen a case. Where the disease is apt to occur may be judged from some of its many synonyms—ship fever, camp fever, prison fever. The common denominator of all of these is the rat—and the specific carrier is the rat flea, though the ordinary

body louse can also assist. The specific infecting agent appears to be the Rickettsiae.

The Rickettsiae are minute spheres or rods, sometimes a combination of the two, which live in the cells of the attacked animal. They appear to like certain cells better than others; if such a bit of tissue is examined under the microscope, it will be found to be packed with these little irregularly round bodies.

It is interesting to note that originally quite possibly the Rickettsiae were only parasitic to insects, but as time went on they extended their attack to animals and man. Two reasons for this assumption are that similar organisms appear to attack many insects, and that when Rickettsiae are artificially grown in the laboratory they grow better at the lower normal insect temperatures than they do at the higher temperatures, normal for mammals.

Early in the sixteenth century, Fracastorius recognized typhus. Typhus fever has been one of the great epidemic diseases of mankind. Wherever man is crowded under unhygienic conditions, and rats can breed, and fleas bite, typhus spreads. In the long run, typhus probably kills more soldiers than bullets do during a war. Almost every great war has had its accompanying severe epidemic.

In the First World War, the German, Austrian and Russian armies were ravaged with the disease on the Eastern Front, as well as the civilians in that region. The Germans managed to keep the infection partially localized so it never appeared on the Western Front, hence French, English and American troops were free of the disease. Had infected men entered the Teuton trenches, this disease would have spread everywhere, for conditions in the Allied trenches were ideal for it, and neither rats, lice, nor Rickettsiae are respecters of uniforms or military orders.

Important centers of typhus where the disease is always prevalent are central Europe, Russia, northern Africa, Ireland, Siberia, northern China, Indo-China, and Mexico. What effect the present wars in Europe and China will have on further rapid spread can only be conjectured. The disease is restricted in South America to Chile and Peru. Sporadic cases exist in the United States, especially in the Southeast. As early as 1910, Nathan Brill reported mild cases in New York which were thought to be imported from Central Europe, but since 1928, a great many cases have been reported from Florida, Alabama, and Georgia. These do not appear to be importations, and check of the lousy living conditions among those who have the disease offers adequate evidence of the American origin.

After an individual is bitten by a rat louse or flea carrying Rickettsiae there is an incubation period of eight to twelve days, and then symptoms start abruptly. There are chills and body stiffness and a sharp rise in temperature. Muscle and back pains are present, and the patient is sufficiently weak to welcome bed. The face is flushed, the expression anxious, and the mental condition excited. About the fifth day, irregular pink oval spots appear all over the body, but are most prevalent on the trunk. The tongue is very dry and there is a cough. The skin eruption gradually turns darker till it becomes brownish red or purplish. Fever meanwhile keeps zooming with brief falls. Most severe are the mental and nervous symptoms. The patient becomes delirious, then unconscious. His muscles twitch; he loses control of his bladder and bowels.

If all the symptoms become worse, the patient usually dies about the twelfth day.

If not, striking improvement occurs. The rash fades, and though the patient may remain delirious, his skin and tongue become moist and his general appearance ceases to be desperate.

THERE have been some interesting and quite successful attempts to prepare vaccines for the prevention of typhus fever. The difficulty usually has been that not enough organisms can be artificially cultivated in a test tube—as with ordinary bacterial vaccines—to make a good protective vaccine. Rickettsiae, you will remember, requires a living medium in which to develop plentifully.

As a result, some ingenious methods have been developed. Weigl, in 1930, took lice, anæsthetized them by placing them on a block of ice, and then injected suspensions of infected material into their rectums! The Rickettsiae developed rapidly in the intestinal canals of these lice. The intestines were then dissected out, ground up, and the material suspended in salt solution. This method gave an extremely effective vaccine, but the labors of making it and the small yield make it unpractical.

Then Zinsser and Castadena, 1931-32, developed another ingenious method. Rats protect themselves against developing typhus by the production of a large number of special cells—lymphocytes—which engulf and destroy the Rickettsiae. Normally, therefore, the Rickettsiae do not develop plentifully in their bodies. But if the rats are subjected to X rays first, the lymphocytes are not produced, the Rickettsiae can multiply in great numbers, and a successful vaccine can be made.

Another ingenious method to produce a weakening of the lymphocytes was to feed the rats a diet deficient in certain vitamins. This, in some instances, was more successful than the X-ray method.

In the last two years, methods have been developed which enable Rickettsiae to be cultivated in test tubes. This is, of course, a great advantage in cheapness, economy, and efficiency over the earlier methods. The Rickettsiae are grown on minced guinea pig tissue. A still newer method showing great promise is the cultivation of Rickettsiae in living chick embryos. The eggs are inoculated and the Rickettsiae grow luxuriantly in the yoke.

To summarize: Methods are now available to produce effective Rickettsiae vaccines on a large scale and not too expensively. What this will do to control typhus in southeastern Europe, China, and Mexico can only be conjectured—but the outlook is the most hopeful yet.

ROCKY MOUNTAIN spotted fever is also a Rickettsiae disease. Indians knew of it for years, but it was first reported in 1896 by Surgeon Major W. W. Wood. The disease occurs where a particular insect—the *Dermacentor andersoni*—a tick, lives; it covers most Rocky Mountain States and is gradually spreading. Within the States themselves, the disease is often restricted to particular localities. In Idaho, for example, the disease occurs only in certain counties, while in Montana it was at one time restricted to the western side of a valley, not invading the eastern portion till many years later. But infections are being reported more and more frequently all over the United States, especially lately in the East.

The disease is almost entirely a spring affair, beginning with the melting of the snows and lasting till the ticks cease their activity early in July.

Monkeys, rabbits and guinea pigs can be infected experimentally and, naturally, cattle, sheep, and wild animals are tick-infested. The disease appears to be transmitted entirely by one species of tick, but occasionally reports indicate other species may be culpable. The actual infecting organism lives within the nuclei of the cells it invades, and is classed among the Rickettsiae. It is related to the organism of typhus, just how closely it is impossible to say. It has not been cultivated on artificial media, and is not very resistant to antiseptics or physical agents, though it can withstand cold temperatures fairly well.

Four to eight days after a man is bitten by a tick the disease starts. It commences, as so many infections, with slight chilliness, malaise, and loss of appetite. There are often muscle pains, especially in the calves and back, and headache. Light hurts the eyes, and there is often nosebleed. The patient feels miserable and is generally glad to hurry into bed. Soon his temperature begins to rise, reaching a maximum of 104° F. to 105°. Usually on the third day, but sometimes a day or so on either side, a rash develops. It appears as rose-colored spots, about a fourth of an inch across, which disappear on pressure. The wrists, ankles and back are first attacked, but later arms, legs, chest and abdomen become involved; finally the palms, soles, and scalp. Gradually the spots deepen in color and hemorrhages appear in their centers and between lesions. The skin may acquire a sheen. There may be a peculiar mottling which some physicians have compared to that of turkey's eggs.

The parasite attacks the lining of blood vessels, producing irritation. In the small vessels there may be enough defensive reaction on the part of the attacked tissues to block the vessel completely. If a part of the body cannot receive enough blood nourishment, it dies and ulceration eventually occurs. These dead areas are common about the fingers and toes.

Patients are often delirious; restlessness and sleeplessness are common. The most critical period in the disease is toward the end of the second week. A sudden jump in the white blood count means some other organism has attacked, also, and is a very dangerous sign. Young people generally recover, the death rate climbing with the age. In some regions only a few die; in others over ninety percent. Fifteen percent is probably a fair average.

Moderately successful immunization has been obtained by grinding up ticks, soaking the mass in phenol, and injecting the result as a vaccine. Maybe you remember this from the picture "The Green Light." The best prevention is the destruction of ticks—an extremely difficult task when one considers the enormous areas to be covered. Dipping cattle to get rid of tick infestation is a useful but inadequate method. Cultivation of previously wooded fields has eliminated the pests from certain regions. In Montana the introduction of other insects parasitic to the ticks has been tried. For the individual, the best preventive is to avoid being bitten. This means high laced boots, thick woolen socks, and a strip of greased felt at the wrist and neck lines. Frequent

baths and inspection of the body is helpful because ticks may cling for a long time before biting. There is no specific treatment, except transfusion from a convalescent or immune donor.

Just one step in size beneath the Rickettsiae are a group of organisms which attack birds primarily and later man.

Love birds are not always loving. They, together with parrots, parakeets, and other members of the psittacene family, convey to man a highly dangerous virus disease—psittacosis. Ritter, in 1880, described a pneumonialike disease in homes where there were sick birds.

The usual story is that there is a sick parrot in the house. Canaries and finches may also be at fault. One or several members of the family suddenly develop headache, malaise, loss of appetite, chills, fever and cannot stand bright lights. Then sleeplessness, delirium, and a nonproductive cough ensue. The temperature mounts rapidly, not falling if the patient lives until the second or third week, and then only slowly. The physician finds the signs of consolidation in the chest, but the infection does not look quite right for a typical pneumonia. Early there may be X-ray evidence of lung involvement.

Probably thirty to forty percent of the victims die. Those under thirty years of age seem to have a better chance. There is no specific treatment, and the disease is extremely contagious. The best prophylaxis is the complete elimination of birds as pets. In an epidemic in the pet shop of a large Pittsburgh department store, many store employees were mysteriously sick, many died before the cause was discovered.

YOU MIGHT think that every virus or viruslike substance is man's enemy, but he has one friend—the bacteriophage.

In 1917, Felix d'Herelle was attempting to find some method of making a more potent dysentery vaccine with which to immunize the troops in Flanders. Among his many experiments was one in which he conceived the idea of growing the organisms in filtrates of parent cultures. By this method he thought he might obtain a product with greater power to immunize.

But to his surprise, the bacilli, instead of growing well, grew less. He filtered this partially growing culture through a Chamberland-Pasteur candle, which is a type of filter too fine to permit bacteria to pass, and added some of this second filtrate to other cultures. To his further astonishment the tubes, after first becoming cloudy as was normal, suddenly began to clear, until they were as crystallike as if there had never been bacteria added to them.

This was indeed curious. When he smeared the clear cultures on a glass slide and looked at them through a microscope he saw only a few shadowy ghosts of bacteria or nothing. Something in the filtrate was destroying or killing the bacteria. Of course, this was in a way an old thing. For years, various cultures had been known suddenly to clear, the bacteria in them apparently being dissolved and dying. Some called them suicide cultures.

But no matter. D'Herelle determined to find how strong this unknown agent was in dissolving bacteria. He set up ten tubes. In the first he put some filtrate diluted one to ten with bouillon; in the second, dilated one to a hundred; in the third, one to a thousand; and so on,

till he reached one to ten million. Then he added the same amount of cloudy cultures to each of the tubes and to a control to which filtrate had not been added. The bacilli began to grow and all the tubes became cloudy. But then those to which filtrate had been added gradually began to clear, the ones where the dilution had been greater taking the longer time. Nevertheless, when it did occur, clearing was just as effective in the one-to-ten-million tube as it had been in the one to ten. When he took a culture which had received such a minute bit of filtrate and cleared, filtered it, and then added this filtrate to another set of ten tubes, the same phenomena was repeated.

Now, D'Herelle, who had by this time shifted his experiments to India, realized he had something new. It was something which could be grown generation after generation; he had perpetuated the same race as many as a thousand times. It was effective in unbelievable dilutions—he had cleared cultures with dilutions as high as one to a trillion! It multiplied. He could have started with a drop, or even a trillionth of a drop, and make a bathtub full, or a pond, or a whole lake. That was, providing he had enough media, for the substance only multiplied in the presence of bacteria. Without them it simply refused to develop. They seemed to be a sort of food for it. The substance passed through filters which bacteria could not. And it dissolved or lysed bacteria. To this new, mysterious lytic agent he gave the name *bacteriophage*, or eater of bacteria.

What was bacteriophage? D'Herelle conceived of it as a sort of living organism, perhaps the tiniest. It was just like other bacilli, except smaller; and as the larger bacilli fed on people, so did bacteriophage feed on germs. Another school, however, believed that bacteriophage was not a living substance at all, but more in the nature of a chemical, a sort of self-perpetuating enzyme save it had the ability to reproduce itself. There were violent scientific quarrels.

The real answer is probably that no one is quite sure what bacteriophage is, but its discovery has done much to further virus investigation if for no other reason than it can be handled so much more safely than the far more dangerous viruses.

Now, what are these dangerous viruses? They are described and called "filtrable" or "ultramicroscopic." They are called *filtrable* because they can pass through filters which are far too fine to permit any ordinary-sized bacterium—no matter how small—to pass. They are termed *ultramicroscopic* because they are beyond the range of visibility of even the most powerful microscopes.

In size, viruses range from the largest—that of smallpox, which is about six millionths of an inch in diameter—to the smallest recognized, that of animal foot-and-mouth disease, which is about four ten millionths of an inch.

A great many serious diseases have been attributed to viruses. We can only mention the more important. They include—measles, mumps, smallpox, chickenpox, yellow fever, sleeping sickness, and infantile paralysis. Also probably virus in nature are the common cold and influenza. Certain forms of cancer are apparently related to viruses. Many plant and animal diseases are caused by this ultramicroscopic agent.

Fortunately, against some of these

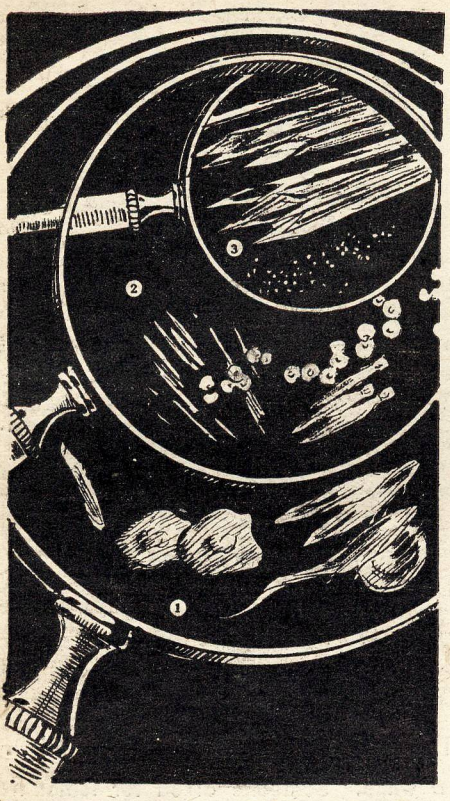
virus diseases, man has made great progress. One need only mention the success of vaccination against smallpox. Before the time of Edward Jenner, (1749-1823) millions either died or were disfigured for life by smallpox. The story of his observations that English milkmaids who had cowpox never developed smallpox, and from this his development of vaccination as we know it today, was the first great step in the control of virus diseases. The principle proved here was that a virus disease which existed in one species—the cow—might be transferred to another species—man. While not being nearly so fatal to man as was true smallpox, the animal disease was still able to confer upon humans a high degree of immunity to the real smallpox.

The next great step was a method of treatment for rabies or hydrophobia.

"Mad dog!" rings the cry in the hot dog days of midsummer, and mothers clutch their children and shrink when stray dogs scamper about the streets, their jowls dripping saliva. Few of these animals have rabies, for the disease is rare even among dogs, but since Aristotle in 300 B. C., man has been taught to fear the water-hating sickness. Many dogs have been slain needlessly, and many children have died horribly because of false sentiment or fear about dogs and the disease.

Rabies is historically significant because it was on it that Pasteur started his famous studies. In 1884, Louis Pasteur demonstrated that hydrophobia was transmitted by a filtrable virus, that it was contained in the spinal fluids of the mad animals, and that immunization of man and animals was possible.

Not everyone who is bit by a mad dog develops rabies; only forty percent of dogs and sixteen percent of humans who are bitten develop the



Descending orders of life: (1) Protozoa, minute but highly organized animalicules. (2) Far smaller, the bacteria, and, again far smaller (3) virus molecules and tobacco mosaic virus crystals.

full-blown disease. Many animals besides canines are susceptible to the infection. The virus exists in the saliva, and does not have to be introduced through a bite. Any break in the skin is sufficient.

Where the virus comes in contact with the body is probably of more importance than the number or depths of the wounds. The nearer the injury is to the brain, the shorter the incubation period, which is generally between three and eight weeks. Some weeks after a bite, the victim may note numbness or irritation around the apparently healed wound. His voice becomes husky, and he has trouble swallowing. He is nervous and irritable, is unable to sleep, and has a headache.

Great excitability then commences. The patient becomes extremely sensitive to all kinds of stimuli. The slightest motion about the mouth causes violent spasms. Attempts to drink water provoke violent intense pain in the pharynx, so the patient dreads the very sight of water—giving the disease its name. Such a stage lasts for about three days. Then paralysis follows, the patient loses consciousness and dies in six to eighteen hours.

Without the Pasteur treatment, every patient died. Fifty years and thousands of cases have proved the worth of the treatment. It is done this way. Rabbits have rabies virus inoculated into their brains. A week later the animals are killed and the spinal cords are removed. The cords are then dried and treated with carbolic acid. The longer a cord has dried, the weaker is the virus it contains. Injections are then given to the child who has been bitten, commencing with the oldest segment of cord, hence weakest, and increasing to the shortest treated, or strongest. During this procedure the patient gradually develops immunity to the rabies virus acquired at the original bite. If his immunity develops faster than the virus ascends to his brain, his chances for recovery are good. If his immunity is slower, chances are poor.

Prophylaxis consists in the muzzling of dogs and careful segregation of sick animals. Dogs themselves can be vaccinated against the disease.

Herpes simplex, or fever blister, is another virus infection which is often

associated with diseases in which there is a high fever, though it may occur in those seemingly well. It is most frequently seen in pneumonia, malaria, and meningitis. Usually one or two blisters form on the lip, itch a bit, rupture, and generally heal in five or six days. One danger is that primary lesions of syphilis are sometimes laughed off by those having them as "just a fever blister."

Warts, or verrucae, too, are apparently caused by a filtrable virus; that is, the material in a wart can be ground up, pressed, and filtered. The filtrate produces another wart. Treatments for warts are legion, including burying frogs waved at a dead man in the dark of the moon. One curious thing about warts is that purely psychic treatment often does cause their disappearance—which may explain the success of so many witchlike remedies.

Since warts are in a measure overgrowth of tissue, the question of virus as the cause of cancer has for a long time been proposed. From time to time, someone will state definitely that cancer is caused by a filtrable virus. Most of these findings have not stood the test of time or repetition, but the idea that some cancerous growths may be initiated by some filtrable agent akin to the viruses is by no means impossible.

One type of cancer in chickens—Rous sarcoma—appears to be indisputably linked with an invisible filtrable agent. Tumors in one chicken may be cut out, mashed, pressed and filtered, the filtrate injected into another chicken, and the same type tumor will develop. The procedure can be continued repeatedly. No human cancer, thus far, has been definitely proved to be caused by a virus—but with new discoveries almost daily in the chemical nature of viruses it is not inconceivable that the answer to part of the cancer problem may be found.

To INDICATE how complex the problem of virus transmission is, consider the following instances. During recent years a disease has been noticed among horses. It is called *equine encephalitis* and is similar to sleeping sickness in humans. Basically, it is an infection of the brain, and can kill previously perfectly well horses within a few days. The animals first lose all interest in their food, then lose their ability to stand, soon slump, and die.

In 1938, one hundred eighty-five thousand horses died. Then various veterinary schools and the United States army got busy.. They developed a method of preparing vaccine by cutting a small hole in chicken eggs, inoculating them with virus from a diseased horse, and growing the virus in the chick embryo. The embryos were then harvested, treated with formalin to render them noninfectious though still capable of conferring immunity, and injected into horses. Largely as a result of this vaccination among enormous numbers of horses throughout the entire country, horse deaths from encephalitis fell, in 1939, to eight thousand.

But another problem arose. Cases of horse encephalitis soon appeared in humans and at least twenty-eight died. Now how was this disease carried from horses to humans? Insects, especially mosquitoes, were proved able to carry the virus. And within the last year a most startling discovery has been made. Birds, particularly pigeons, have been found to harbor this disease. And then some

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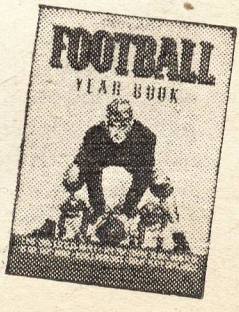


enterprising investigators studied the brains of ring-necked pheasants picked up in the wake of the great New England hurricane. Terrifyingly, encephalitis virus could be cultured from the brains of these wild fowl. Similar observations have been made on mallard ducks.

What does this mean? It means that if viruses are carried by birds, scarcely any area in the United States, or the world, for that matter, can really be adequately protected.

But viruses are not satisfied with birds. Like man, they seek something faster—and now they use airplanes. In the center of Africa a man has yellow fever. He is bitten by a mosquito. The virus enters the mosquito's salivary glands. The mosquito boards a plane to Capetown. In two days it can be in Brazil. In another two days in Miami. Thus, in less than six days a virus particle which was killing a native in the bush country of deepest Africa can be injected into the blood stream of an American anywhere. That is why such rigid fumigation and inspection for insects is performed on all planes which enter this country from distant lands.

SINCE 1936, the concept of viruses has changed. To understand this, we must turn for a moment to plant pathology. There is a disease of tobacco plants called "tobacco mosaic." It derives its name from the mottled, moth-eaten, appearance of the leaves of diseased plants. If sick leaves are ground into a pulp, pressed, and filtered through a porcelain filter so fine it excludes ordinary bacteria, the filtrate will produce the original type of disease. Nothing is visible microscopically. Hence the disease has come to be regarded as a typical virus disease and has been used extensively for experimental purposes, since it can be handled safely by workers in marked contrast to the human virus diseases, which tend to be extremely fatal.

Wendell M. Stanley, of the Rockefeller Research Institute of Princeton, took some infected leaves, pressed them, obtained virus-containing filtrate, and then proceeded to purify it by a complex series of chemical maneuvers. After a number of manipulations, he finally obtained needlelike crystals. Well, there's not so much to that, you might argue. But when he placed some of these crystals on healthy leaves, the disease immediately started, and furthermore, he could take the diseased portions and from them infect new healthy leaves. And all, mind you, started from a chemically pure crystal, *as dead to our previous understanding as a grain of salt.*

Now what did this mean? It indicated that certain viruses, instead of being living things, like bacteria, might be merely a unique sort of chemical which had the peculiar capability of reproducing itself. Just as though you put one grain of salt on a lamb chop, and that multiplied to cover the whole piece of meat, and then you took a bit of it and placed it on your neighbor's chop, only to have it multiply in turn and flavor his, and so endlessly. It also suggested a hope for the control of the viruses. If virus diseases were chemical in nature, it was conceivable that some other chemical might be found which would neutralize the baneful effect of the disease-producing sort. Then all that would be necessary to prevent or cure virus diseases might be the simple taking of a capsule of this neutralizing sub-

stance. This has not occurred as yet, but work is progressing.

But this discovery of the reproductive powers of a crystallized chemical substance also leads to an uncomfortable situation; science requires exact instruments, and words are instruments as much as scalpels and microscopes. The definition of "dead" and "living" has—disquietingly—begun to resemble a microscope with a badly fogged lens. By "dead," men generally called forth in other men's minds a concept of something inert, crystalline, purely a single chemical substance, perhaps, incapable of self-reproduction.

And—presto!—a crystalline, inert, chemical substance proceeds to display the typical properties of life!

In 1937, Stanley showed that at least two virus diseases consisted of enormous protein molecules, perhaps three hundred million times the size of ordinary hydrogen molecules. Further, that by various means, X ray for example, these huge proteins might be considerably changed to other proteins. Thus a virus which started as a disease of tobacco plants might, under proper stimulation, mutate to a disease of rabbits, thence to one of humans, say to common cold, and then into a more specific type, say infantile paralysis, or sleeping sickness. This is all still highly experimental, but it is the furthest advance to date in the exploration of the viruses.

Dr. Stanley received the American Association for the Advancement of Science's thousand-dollar prize for his work in 1936. It is interesting to note that the day he was supposed to receive the award he was unable to because he had been attacked by one of the virus diseases he had just uncovered—influenza.

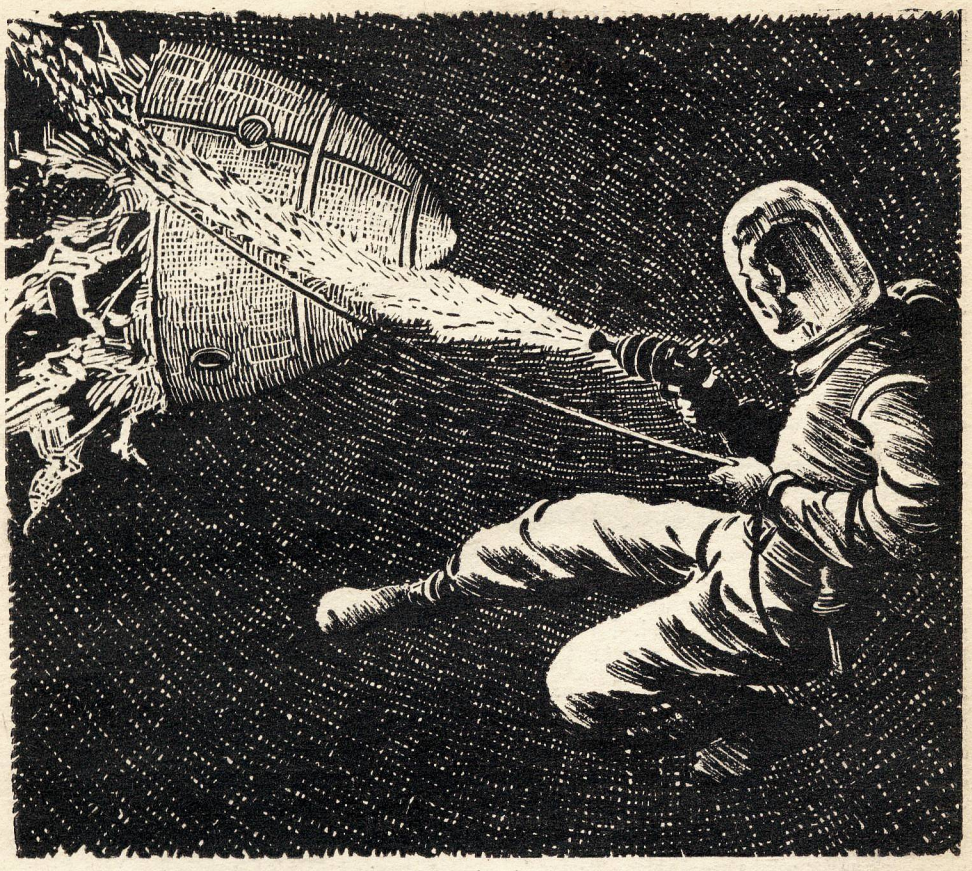
Now what does all this mean? We have traced living particles down from the fairly large Rickettsiae, through the bacteriophage, to the almost single molecule of chemical germs. These last are at once the weakest and the most dangerous of all to man.

As influenza, it drowns him in his own lung fluids; as infantile paralysis, it cripples him; as sleeping sickness, it slugs his brain. It almost wiped out civilization in the great influenza pandemics of 1917 and 1918. It can again. In September of 1939 there was a meeting of the leading bacteriologists throughout the world. The day the meeting started, so did the war.

A secret emergency session was called immediately to determine if any steps could be taken to prevent another great wave of disease. The answer was discouraging. Despite the tremendous progress made in recent years, we are little better able to cope with most viruses than we were twenty or forty or a hundred or a thousand years ago. The amazing drug *sulfanilamide*, effective in so many bacterial diseases, has not been found particularly useful against the virus infections. When viruses strike, they strike, and whoever finally wins a few kilometers on the Western Front will inevitably have to bow to the one real conqueror—General Flu.

So if man continues to kill himself, to waste or destroy his best brains, the ultimate answer may very well be the extinction of life as we know it—and the survival of nothing but a peculiar huge molecule of nucleoprotein which possesses the unique ability to reproduce itself. It may become a chemical world in fact as well as in advertising slogans.

THE END.



LOST ROCKET

By Manly Wade Wellman

Accidents will happen, on planet or in space—but sometimes somebody very much wants them to happen!

Illustrated by Orban

NOBODY really saw the explosion of the *Phobos*—she was too far out between worlds for anything but a telescope to follow, and it happened that no telescope was following. One of Spaceways' best long-shot rockets, carrying supplies and mail from Earth and Mars to the Jovian colonies, she had cut across the orbits of the inner planets, past the Sun, had come almost into opposition to Mars in his own path when it happened.

But it would have been a beautifully terrible sight, had one been watching—a sudden red-and-gold

blooming of the silver-gray torpedo hull, like a seed bursting into radiant life or a dull little star becoming a nova. A brief, brilliant spreading and spending of fiery blush against the black airless sky; and then a wink-out. The shattered hull, that had been gray, was now too sooty to reflect any light. The *Phobos* would be invisible to any searcher, unless that searcher blundered close. The radio, of course, was destroyed. Out of sight, the *Phobos*, and out of hearing. Out of universal mind. The scurrying government rescue patrol began its rush with a three fourths conviction that it was too late.

Yet the wreck was not yet complete.

James Murkitt, who had been skipper of the *Phobos*, stirred dully back to consciousness. His head ached where it had cannoned against something—the metal bulkhead. Slowly he remembered. This was one of the two cells in the brig, forward almost in the nose peak of the craft. He was imprisoned here, shorn of rank and reputation, of freedom, too. And now what?

He rubbed his injuries, remembering slowly what had gone before his locking up. One hour before the take-off at the St. Louis skyport, there had hurried up a legal agent for the Martio-Terrestrial League. Had Skipper Murkitt anything to say about the *Phobos*' cargo? Murkitt, tall and tough-limbed, trying to make his lean, young face look extra stern for the sake of dignity, had nothing special to say that hadn't been said already. The *Phobos* was carrying food, medicines, machine parts. Mail, too, of course, including a block of vouchers for products of the various moons—Callistan ores, Ganymedean aromatic mosses and so on—as well as a sealed document commissioning a new colonial governor out there. The old one had been too complaisant toward monopolist barons, had let them grow too bloatingly rich, and now his more sincere lieutenant was to take over.

Well, the League agent had pursued, did Murkitt realize that explosives were contraband on the barely civilized Jovian moons? Murkitt had known it well, was surprised at such a question; had brushed the agent aside and gone aboard and taken off. Then, hours out and just past Venus, the official voice on the radio. Evidence had been examined at home, tending to show that an unlawful case of roving bombs was aboard the *Phobos*, had been receipted for by Murkitt himself. Murkitt was to consider himself under arrest, and First Mate Hollis would command. On reaching Ganymede, formal charges and a trial—

All this fantastic ill luck returned to the prisoner's mind as he looked about him. What d'you know, the cell door was open! *Burst* open!

Murkitt started to rise to his feet —and went out of control. His first attempted step hurled him through the door, brought him up smartly but not heavily against the bulkhead of the corridor outside, as though he had dived through deep water. He rationalized at once. The artificial gravity of the *Phobos* had been shut off, or otherwise put out of commission. Why?

Cautiously, he made paddling motions with his hands. He found out he could swim in the air, he weighed only ounces without the gravity beams to hold him. He glided along the corridor, and looked into the observation room, the foremost compartment of the whole ship.

It was shaped like the inside of a half dome, with a flat floor, a flat bulkhead astern, and the forward

great curve that was the inner surface of the hull itself. A big port was set there. The tables of sky charts and log books had been violently overset, papers floating like bits of down. Only the radio receiver and vision screen, both dead, were in place on their clamped stand. Murkitt got himself to the rear doorway, that led to the stern of the ship, and put his hand to the knob.

He could not pull the door open. Bracing his feet, he tried again. The door gave a little, opening a crack at most, and sudden gales invested him. He ceased trying at once, for he knew the air pressure was falling fast behind that door.

"Get back to your cell!" snarled someone.

Murkitt turned, still holding to the knob. It was the beefy space hand told off to observation duty, which also meant guard duty at the brig. Battiloro was his name and he was broad and truculent, with thick black curls. He half floated at the entrance to the corridor, one hand on the jamb, the other leveling his electro-automatic pistol.

"What the devil happened to us?" demanded Murkitt.

"Can't say. The engines blew up, is my guess. I got thrown the whole length of the corridor, into a locker full of papers—but never mind. Get back to your cell, you're under arrest!" Plainly Battiloro intended to take his guard duty very seriously.

Murkitt paddled through the air toward him. "Easy does it," he counseled. "You must be right—the engines blew up—probably the whole rocket hold. It smashed the bulkheads everywhere but here in the control room of the brig corridor, and all the air besides this is going fast. You and I must be the only living things left aboard."

As though in frantic denial, something knocked furiously on the other side of the door. Murkitt and Battiloro stared at each other, then launched themselves airily toward the spot. Both clutched hold, Murkitt at the knob, Battiloro at the latch, and braced themselves against the jamb for a supreme effort. A surge of their combined muscles, and the door opened ever so slightly; six inches, twelve. The escaping air tried to hustle them out, but they resisted. Whiplike tentacles thrust in, then a shaggy head like a flesh-colored chrysanthemum. The rest of the creature managed to drag itself through the space, and with it trailed something limp. Battiloro and Murkitt let the door close.

THE NEWCOMER was Xonzak, the Martian mechanic's mate, and with him he had brought the unconscious form of Hollis, the officer who had superseded Murkitt in command of the *Phobos*. Hollis, pale and plump, had been cut badly over the forehead. Droplets of blood oozed forth and sailed away in the gravityless air like little red balloons. He breathed heavily, with closed eyes.

Xonzak tried to draw himself erect upon the rear tentacles he used for legs, but, like Murkitt and Battiloro, failed clumsily. Like most Martians in interplanetary jobs, he corseted his bladdery body into rough shape and walked upright instead of crawling like an octopus on his six boneless limbs. He wore trousers and a tunic, and his outline was roughly that of a terrestrial man with an extra pair of arms. His sensitized face petals, which served him as eyes, ears and nose, were distractedly abristle, and he could scarcely form his hissing words with the artificial voice box in his breathing orifice.

"The sship iss losst," he managed. "Blown up—torrn open back therre."

He flourished a tentacle tip at the door through which he had come. "Already the airr iss almosst gone. It musst be vacuum now—the doorr could not open again. I, conditioned to light breathing on Marrss, managed to get herre—drragging poorr Missterr Holliss."

Murkitt stared at his successor, who still sagged limp and quiet, floating near the floor. "You two were in the control room?" he suggested. "It's just behind here, and if nobody else was with you, the rest of the ship must be hopeless. Thirty men gone—the whole business blown into splinters. What did it?"

"That case of bombs you smuggled," accused Battiloro. "This is your fault, Murkitt, and you can't get out of it."

"You lie when you call me a smuggler, and you lie again when you say it's my fault," Murkitt told him in the very mouth of the pistol he held. "Shut up, and let's take stock of ourselves. Four of us left alive—"

"Five," said Battiloro triumphantly, as though scoring a point on Murkitt. "Swen was in the other cell. He'd overslept on the last watch, and Hollis sent him into arrest. If we're alive, he must be."

He swam back through the corridor, and returned with Swen, who had not even a bruise. Swen was a smiling-faced young blond space hand, a competent workman and full of great, good nature toward all the Universe.

"So you escaped, too, skipper!" he cried at sight of Murkitt.

"He's not the skipper," reminded Battiloro at once. "There's Skipper Hollis, in the corner—badly hurt."

"He may not rrecoverr," ventured Xonzak, who was trying to treat the injured man. The blood had ceased to flow, but the wound puffed in ugly fashion.

"He's out of it now, anyway," replied Murkitt, "and the showdown is among us four. Battiloro, put away that gun. Until Hollis is fit, I assume command."

Battiloro shook his stubborn curly head. "You aren't an officer—not even a member of this ship's company—since you were put under arrest."

"You talk like a space lawyer," snapped Murkitt. "Remember that I haven't stood trial yet—was only accused. And this ship hasn't a company any more; strictly speaking, it isn't even a ship." Murkitt let himself float toward Battiloro, who set his jaw and pointed his weapon. The muzzle seemed to yawn in Murkitt's face, but did not awe him.

"No sshooting, pleasse," hissed Xonzak anxiously.

"Gentlemen," said Murkitt to the others, "I ask your co-operation—your recognition of my command."

"Of courrsse, sskipperr," said Xonzak readily. "You arre besst fitted forr leaderrship in emergenssey."

"Check to that," agreed Swen brightly, and Battiloro sniffed fiercely. He flourished the gun.

"I've got the only weapon!" he half shouted. "If anybody commands, I do! Recognize that, you three, or I'll start shooting!"

"Shoot, then," dared Murkitt. "Kill one of us, and you must kill the others." He said that without being sure of his two adherents, but he knew he must bluff. "Then where will you be, Battiloro—alone, with three corpses and maybe a fourth?" He pointed to the silent form of Hollis. "Hand over that pistol, and pay attention to orders."

Battiloro grimaced blackly, but held out his weapon, butt foremost.

MURKITT ISSUED orders at once, pretending that there had been no

unpleasantness. He set Swen to checking supplies, Xonzak to computing the volume of air left to them, Battiloro to sealing any slow leaks. He himself went to the fore port to observe.

A glance at the star pattern ahead was enough for his spacewise information. They were still traveling, by the momentum of that mighty final blast, but were far off course. They would miss the Jovian System by millions of miles, and sail away in space—whither? Wasn't Saturn out there, perhaps directly in the new path? Nobody had ever been to Saturn yet—there would be no rescue ships in those quarters. There could be only a crash of this little remaining snip of the *Phobos*, and probably the five of them would be dead long before.

Xonzak reported first, launching himself to Murkitt's side like some strange canny squid in the aquarium. Sibilantly he reported the inner volume of the control room, the narrow corridor, the two cells and some odd lockers as approximately two thousand cubic feet.

"That's four hundred cubic feet for each of us," commented Murkitt. "Not enough to last very long."

Swen joined them at that moment. He had found some concentrated rations meant for the cell occupants, a full tank of water, and four space overalls, complete with magnetized boots and glassite helmets.

"Overrallss, sskipperr!" exclaimed Xonzak. "The bootss will ssolve one prroblem—lack of gravity need not count now—"

"Right," approved Murkitt, "and there's another good feature. Each suit has an oxygen freshener. Bring them here, Swen."

When the space hand had obeyed, the four conscious men donned the magnetized boots and at once were able to stand up on the metal floor, with a sense of weight and balance. Battiloro slung a hammock in which the limp Hollis was lashed. Swen and Xonzak bathed his wounded head, and taped a compress upon the gash. Meanwhile, Murkitt detached one of the fresheners from the inside of its overall. It was a brick-shaped piece of spongy chemical, processed to precipitate carbon from breathed air and released the freshened oxygen.

"This will break down our output of carbon dioxide for a time," announced Murkitt, "especially if we don't exert ourselves too much. When it's used up we'll break out another and another. We can live for some days, at least."

"That makes me feel better," grinned Swen.

"Not me," responded Battiloro. "We'll never get out of this."

Murkitt now had time to examine Hollis in his hammock. Under the wet compress the wound showed compact, the bruising cut of a small blunt object. "How did it happen, Xonzak?" he asked.

"I cannot be ssurre—things were abrrupt," replied the Martian weightily. "Missterr Holliss wass at the contrrolss. Hiss head musst have sstrruck the end of the massterr leverr."

"Perhaps," nodded Murkitt. The master lever—if in its socket on the control board—would have been in front of Hollis. If his head struck it, there would result just such a mark; but a new thought came. "Why would the master lever be in place, Xonzak?" he pursued. "Generally it hangs on the rack—isn't fitted and used unless the machinery is to be started or stopped—only on the take-off or the landing. And we were in midspace!"

The head petals stirred and Xon-

zak wagged his cranium. "I cannot ssay, sskipperr. Naturrally, things arre sstill hazy in my mind."

"Naturally," Murkitt agreed, and replaced the compress. What could Hollis have meant to do with the lever in position, except to stop the ship? His mind returned to his own arrest, the reason for it. Had Hollis engineered his superior's downfall, to win command himself, or other reward? He wished the injured man would wake up.

"He may die at any time," observed Xonzak, as if reading Murkitt's mind.

"Let's eat," pleaded Battiloro, gruffly. "It may take our minds off this jam."

THEY ATE—not much, for Murkitt had already divided the supplies of food concentrate into slim rations for ten days—and then continued their investigations. Murkitt then sounded the floor of the observation room in various places, tapping with the butt of Battiloro's gun. At length he decided that there could be no air left in any of the chambers below. He also examined the light fixtures and the radio equipment.

"We're on a storage battery here in the observation room, not a dynamo," he remembered, "and the lights are all right for as long as the battery lasts. But why should the radio go to pot?" Standing by the metal stand where the vision screen and the receiver were set, he snapped the switch unavailingly. "No good."

"Rradio iss a delicate mechanissm, eassily jammed," offered Xonzak dryly. "But I know ssomething about it—I will try to rrepairr."

"Do that," urged Murkitt, and the Martian began to poke experimentally among the wires and tubes. He refastened some connections, tried the switch again with no success. Finally he traced a wire downward to its floor connection.

"Herre iss wherre the powerr iss dead," he announced. "The connection beneath thiss floorr iss brroken."

"And there may be a leak at that point," chimed in Murkitt. "Feel, Xonzak. You get a suction? Then let's plug it tight."

He himself pulled the connection from the hole, and Battiloro hurried with cement and a patch of rubber fabric. "That closes it," he said, smearing furiously.

But Murkitt was fairly scowling at the end of the radio connection he had drawn up from beneath. "Look, Xonzak," he snapped.

Xonzak's shaggy visage came close. "A clean brreak, ssirr."

Murkitt shook his head. "No. No break. The wire was cut."

He dropped the end of the wire, his scowl becoming a grim ravine between his hard eyes. Sabotage, then, before the explosion. Who had scuppered the control-room radio? Why? Was there relationship between this and the explosion—and did that mean that the explosion was deliberate? Murkitt was afraid so. He walked over to Hollis' hammock, the metal soles of his boots clanking faintly, and studied the injured man. If only he would wake up.

"Attention!" he rasped, and the three others came forward expectantly. "What reason could there be for blowing up the *Phobos?*" he demanded.

Battiloro cleared his throat nastily. "You ought to know," he accused.

Swen's usual good nature seemed to desert him. "Don't talk to the skipper like that," he admonished Battiloro. "It was an accident—bombs aboard—"

"Roving bombs," reminded Murkitt. "Each with propulsion equipment, to be launched and guided by

radio beams, even around corners—and exploded only by a deliberate change of power quality. The only radio in reach was the regular ship set, wasn't it? As for the engines, they were in fine condition, inspected just before take-off. The fuel—" And he paused, looking at Xonzak, who as mechanic's mate would know about it.

"Prroperrly mixxed at all timess," the Martian assured them. "Of courrse, at the unlucky moment I wass away from the enginess—had come into the contrrol rroom, to assk Holliss a rroutine quesstion." He, too, turned toward the figure in the hammock. "If he wakened, he might help uss clearr up the myssterry."

"He may waken still," said Murkitt. "Well, stand easy. I want to think."

But thinking helped very little. It was more evident than ever that the whole disaster was the willful act of someone, presumably a member of the ship's company—a time bomb placed at the beginning of the voyage could hardly have gone undiscovered. But such a wrecker, even if he survived the blast, could hardly hope to escape in the end, to enjoy whatever advantage he had striven for. And, once more, what advantage would there be?

The craft had carried staple goods for the Jovian settlements—nothing valuable or rare, and destroyed by now anyway. Vouchers, too, representing a big sum—but good only in exchange for Jovian produce. That was all, except mail—except mail!

That demotion of the colonial governor had been aboard. Without its actual service on the official, like a summons to a court trial, the ally of greedy magnates would still hold his position, for a time anyway. That limited term might be very valuable to him and his accomplices—

Battiloro was approaching truculently, with Xonzak fluttering agitatedly after him. The first words spoken showed that it was Battiloro's turn to read Murkitt's mind.

"Listen," said the burly space hand, "I've been chinning it over with the Martian brother here. The only reason for blowing up the ship, it looks like, would be to keep that demotion from being delivered to the governor; it would be an inside job, and the insider would put himself in a safe spot—like the cells, for instance—"

"No, no, Battilorro!" protested Xonzak, touching the man's heavy shoulder.

Battiloro shrugged off the tentacle.

"You planned it, and your own arrest! I'm through, I won't take orders from a rat—or even stand him around!"

And he clipped Murkitt solidly on the chin.

Murkitt swayed back, almost to the floor, like a pendulum in reverse. With any considerable gravity to reckon with, he would have slammed heavily down. As it was, a bracing of his leg muscles snapped him back upright, and into the conflict.

He broke ground, so that Battiloro plunged awkwardly past as he followed up the attack. A moment later, Murkitt's lean hard hands had seized Battiloro's outflung left arm. He heard Swen cry "Whee!" in sudden ingenuous applause, as he pushed the captured wrist down to the hip, back past it, then up behind. A moment later he had completed the hammer lock. Battiloro howled and swore, and Murkitt forced him to bend helplessly forward.

"Xonzak! Swen! Get those shoes off of him!" Murkitt panted.

The Martian only dithered, but Swen came readily forward, lifted first one and then the other of Battiloro's feet and tugged the magnetized boots away. Battiloro floated miserably in midair, still prisoned by Murkitt's punishing grip.

Murkitt towed him out of the observation room, down the corridor, and thrust him into the cell where Swen had been kept. He locked the still adequate door behind the prisoner, and returned gloomily. Swen was still grinning, as though in excitement, and Xonzak bent about Hollis as though to minister to him. Hollis was resting easily by now, though the bruising cut on his forehead had turned purple-black.

"Battiloro spoke this much truth," announced Murkitt. "The explosion was probably sabotage, and the guilty one probably arranged to survive the wreck. On top of that, he probably has a plan for his eventual escape. Now, then"—and his voice grew hard—"which of us is guilty?"

"Not me," replied Swen at once, his eyes widely earnest.

"Norr I," added Xonzak, more grammatically. "Could it be poorr Missterr Holliss?"

"More likely Battiloro," suggested Swen. "That was why he tried to hang the blame on you, skipper."

Murkitt did not comment. "I wonder," he hazarded, "if, when his rescue comes, the rest of us will be allowed to live—probably not. I rather think that the wrecker figured to be a sole survivor, and any others who escaped are only in his way."

MURKITT WENT to where the space overalls were spread out, and donned one of them. He tightened the joints at his boot tops, zippered and sealed the front, fastened his gauntlets. He paused, holding the clouded sphere of glassite that did duty as helmet.

"I don't trust you two," he informed Xonzak and Swen. The Martian purred protestingly, the terrestrial gazed open-mouthed, and Murkitt went on: "Somebody among us is guilty of sabotage, murder, and treason. It may be Hollis, lying there in the hammock, or Battiloro yonder in the cell. But it also may be one of you."

He tramped to the stand where the dead radio stood, and laid upon it the electroautomatic pistol that had been Battiloro's.

"Both of you stay away from this," he warned. "Keep opposite corners of the room—and watch each other. If one of you tries anything funny, the other must dive for this gun and blast him. Understand? I'm trying to checkmate you both—make you afraid to move until I get back. Because I'm going outside."

"Iss thiss wisse, sskipperr?" parleyed Xonzak.

"It's necessary," snapped Murkitt, and on went the helmet.

He walked into the cell corridor, and in the opposite direction from the cells. There was a narrow valve-like door—the lock panel. He entered, closed it behind him, stood for a moment in a cabinet-sized compartment, and then opened the outer hatch. In a moment he was out on the hull, standing erect upon it in the airless darkness.

He brought an electric torch into play, and for the first time was able to see the extent of the damage. All the ship had been blown up save the nose, a curved piece of the hull that included and sheltered the observation room and the adjacent corridor. Behind this one solid bit, held to-

gether by tenuous mutual attraction, came a jumbled comet's tail of smashed pieces. Murkitt then stared ahead, and saw what he half expected—a drifting point of white light, noticeable only to the practiced eyes of a space navigator who knew how to look for movable glows among the fixed patterns of stars.

That would be the full rocket flare of a craft, Murkitt told himself, lingering far out and away, many hours ahead of them—patrolling back and forth until this smudged derelict remainder came into view and reach. Rescue, then, for the agent of the barons on the Jovian moons—death, undoubtedly, for any who had survived with him. And Murkitt did not want to die, not without a struggle.

He walked backward to the shattered edge of the sound hull fragment, and swung from it into the midst of the junk. From this direction came the radiance of the Sun far astern, and he was able to see without his torch.

He had come into the smashed control room, back of the observation quarters, and almost at once he spied something—at the foot of the blackened and fused remains of the control board lay a long blackened bar. He picked it up. The master lever!

So it hadn't been in place for Hollis' head to smack into—or, if it had, it had fallen free very strangely. Murkitt studied the control board. The master-lever socket was fused completely into a lump—if the lever had been in place, it would have held there by the sudden flux of molten metal. Something fishy, decided Murkitt, about Xonzak's story. He'd question the Martian later. But now he must resume his survey of the wreck.

FIRST he looked for possible bits of salvage among the mess that had

been the engines, but every part had been blown to splinters. He came cautiously along what had once been a corridor and was now a frayed metal tube, to the old arms locker, not far from the door of the observation room. His eyes lighted up within his helmet. Here was something: A metal solvent ray thrower, big and powerful enough for his purpose. It was as large as a small cannon, but easy to handle without the gravity pull that the ship had once had. Emerging with it, he poked elsewhere in the clutter, and brought out a tangle of extra-strength steel cable that had escaped the disaster. He lugged his prizes back to the surface of the nose cap, and there toiled to unsnarl the cable.

When he had done this, he bent one end fast to a stout mooring hook at the center of the nose cap. The other he attached to the grip of the ray thrower.

"Now for it," he said aloud to himself, and mused dolefully that only desperate men talk aloud inside their space helmets.

Stooping, he undid his magnetized boots. With bits of line he bound the ankles of the overalls so that no air would escape, then stepped out of the boots, which clung firmly in place on the hull. He hoped that his thick socks would baffle for a time the chill of naked space. He took the ray thrower in his arms—its weight was, of course, negligible. And he bent his knees and launched himself with a jump.

Away he soared into the starry blackness, floating outward like a kite. He traveled for many yards, until he came to the end of the cable with ever so gentle a jerk. He rode at an angle well to one side of the scuttled *Phobos*. He pointed the ray thrower in the direction that the wreck was traveling, and touched its trigger switch.

Fire gushed into the dark, fire full of destructive power—and motive power. Like a rocket, the thrower recoiled and hurled backward. With it sped Murkitt, finger still on the switch. Only a moment whipped by before he, the ray thrower and the cable end were all streaming back behind the wreckage, and the fire still flamed. It caused a steady and insistent drag. Murkitt touched the cable with a sock-clad toe—it was as taut and humming as a banjo string. Would it snap? Would he and the ray thrower fly off into space, separated even from the fragile pretense of security represented by that one solid tip of the old *Phobos?*

He peered, and saw that the nose cap had changed position. The tug of the recoiling ray thrower against the cable had shifted that course to which it had held ever since the wreck. It shifted more as he watched, and more—he could see the difference in its apparent shape. Warily he cut the force of the ray a little—he did not want to serve as a brake to all that momentum, he only sought to change its direction.

A minute passed—fire gushing, cable vibrating. And, like a toboggan rounding a curve, the mass of scrap metal that had been the *Phobos* at last reversed itself. It was now pointed for, and traveling toward, the place whence it had come. The Sun was upon the nose cap, the inner planets stared into its face.

Among those inner planets would be cruising rockets. One might sight them, haul alongside, investigate—and save. Murkitt realized that he was hoping, for the first time, to survive this adventure and avert destruction. He shut off the ray, un-

fastened the thrower and slung it to his girdle by a latch strap. Then he drew himself along the cable, hand over hand, coming at last to the remainder of hull and donning his metallic boots. Standing up, he peered down at the port beside his feet, and at the lighted observation room beyond it.

JUST inside, by the radio stand, Xonzak and Swen confronted each other, tense and watchful. Xonzak flourished his four upper tentacles, threateningly and terrifyingly. Swen shook his head, tautened himself more. Xonzak came a gingerly step nearer, his whole person fairly exuding menace.

They meant killing—and for what but that one of them knew the other guilty of the crime that had brought about this plight? Which would that be? Gazing in fascination, Murkitt checked over all that he remembered of each—it would be Xonzak. Yes, certainly Xonzak. The Martian alone had come unhurt out of the destruction of all the ship astern of the observation room. He must have felled Hollis with a blow of the unshipped master lever just before the explosion. The seeming heroism of that rescue was part of the plot, somehow. And now he had betrayed himself to Swen—Swen the stupid one, who nevertheless showed courage and determination.

Xonzak leaped sidewise for the stand where lay the electroautomatic pistol. But Swen got there ahead of him.

The weapon sprang up in Swen's hand, flashed once. Xonzak's flower head flew in rags from his corseted octopus body. The rest of him somersaulted in midair and fell backward, sliding gently along the floor into a corner. It lay without a quiver.

"Bravo!" whooped Murkitt, almost deafening himself inside that glassite helmet. He struck with the butt of the ray thrower on the port, and as Swen whipped around with the electroautomatic in his hand, Murkitt stooped toward him and made wide applauding gestures with his gauntleted hands.

Swen smiled embarrassedly, like a boy caught stealing cookies, then pointed to the side where the lock panel would be. Murkitt went to the panel, let himself through. Just beyond was Swen, eying him expectantly. The muffled voice of Battiloro beat upon them from the direction of the cells, howling for instant release.

"I had to do it," mumbled Swen, as Murkitt unshipped the helmet.

"It was splendid!" Murkitt praised, and shook hands vigorously. "So he was guilty, eh? Xonzak, I mean?"

"Yes—guilty—" Swen thrust the pistol into his waistband. "He said something that gave him away. I accused him. What did you do out there, skipper?"

"Reversed the wreck. We're heading for home." Murkitt described his feat. "Some ship will rescue us, if we have any luck," he finished.

Swen was silent for some moments, as if digesting this. "You'll stand by me?" he ventured at length. "Tell that it was necessary for me to kill Xonzak?"

Murkitt assured him that he would, and they went together into the observation room.

The first thing they saw was Hollis, still pale and drawn-looking, but struggling to a sitting posture in his hammock.

"Swen," he said sternly, "I charge you with murder."

"No, Hollis," argued Murkitt. "He killed Xonzak as a traitor and wrecker—"

"I heard all that they said to each other," Hollis snapped, gaining strength. "I was just coming to when Xonzak accused Swen of engineering the whole smash-up for the sake of a bribe from those Jovian money grabbers. And I got my eyes open in time to see Swen add one more death to the number he's to blame for."

SWEN TURNED to Murkitt with a gesture of pleading helplessness, and Murkitt tried once more to quiet Hollis. "Lie still, old man," he urged. "You're still dizzy with that lick Xonzak fetched you."

"Xonzak nothing!" yelled Hollis, glaring. "It was the master lever!"

"But it wasn't in place—"

"No, it hung on the wall! It was thrown loose with the explosion. As I fell out of my seat, I saw it coming, but couldn't dodge—"

"For Heaven's sake, hurry up!" came the pumped-up roar of the imprisoned Battiloro, loud enough to dominate everything. "Here's the whole payoff! Right in this cell where Swen was—a radio!"

Swen cursed, as one who has overlooked something important, and his hand dropped to the electroautomatic.

"He rigged up a sending set, hid it in his hammock!" Battiloro was blaring. "Must have smuggled parts in with him; it works, too—I've had two messages from a Jovian ship lying out there to rescue him—" And then Swen and Murkitt were struggling for the pistol. Swen's free fist struck Murkitt twice in the face, but Murkitt did not relinquish his first quick clutch on the hand that held the weapon. He wrung and bent wrist and knuckle until, with a whimper, Swen let go. Murkitt grabbed the gun, tapped Swen with the barrel end, and, as he fell back against the bulkhead, seized his throat.

"Confess," gritted Murkitt, digging the gun muzzle into Swen's midriff, "or I'll let you have it, right now!"

"All right, all right! I did it . . . you folks found those roving bombs, but I'd smuggled one away, and got sent to the brig to be safe! I had the radio parts . . . set 'em up to guide the bomb into the rocket fuel storage, and to contact my rescue ship! I expected to be the only one left alive . . . no way to trace it to me, I signed for the bombs in your name—" And Swen broke off, exhausted.

"So that's why they relieved you of command," said Hollis to Murkitt, casting off his lashings. "I thought it was fishy, skipper. Don't choke that prisoner to death—he's needed alive, to make a full statement and carry this wreck home to those Jovian thugs!"

Battiloro was pounding on the door of his cell.

"New signal on the radio," he yelled. "Some government ship, back on our track, is cruising 'round—looking for us!"

Hollis slipped into the boots that had been taken from Battiloro. With Swen between them, the two officers went down the corridor and opened the cell door. Battiloro was tinkering with the makeshift radio.

"Shall I give 'em a signal back, to show where we are?" he asked. "I don't know much, but I can spark out a warning. What?"

"Just say, 'S O S'," Murkitt told him. "The three most beautiful letters in the alphabet."

THE END.

BOOK REVIEW

LIFE ON OTHER WORLDS, by H. Spencer Jones, MacMillan Co., New York, 1940.

One book really "down the alley" for science-fictionists, "Life On Other Worlds" is a fairly comprehensive review of the possibilities of extra-terrestrial life. Logically, it starts with a discussion of the conditions necessary for the existence of life—as we know it—and a consideration of the research means available to us. This preliminary work is done concisely, clearly, and—most remarkable!—in a way that suggests that the author realized that he was not talking to a collection of mental infants. Throughout the book, the attitude is that of a specialist in one line—astronomy—explaining his conclusions, and the reasons for those conclusions, to a mental equal who has not had his specialized training.

In trying to compress the immense amount of background into a book the size of an ordinary novel, his references to past scientific gains are necessarily fleeting. They're refreshers, reminders fully intelligible to someone with a background—but he expects considerable mental agility in his reader. Which is fine for a science-fiction reader who has that background.

The main portion of the book divides the planets and satellites into three main divisions; worlds without atmosphere, the giant planets, and the terrestrial-type planets. The conclusions reached are based on the best data available as of 1940—very different indeed from the material known in 1930, and with some additions since 1935. The section on Mars is particularly complete and interesting.

The final considerations of the book deal with extra-solar possibilities. To that point, the material is clear, forceful, and satisfying, the conclusions understandably based. From that point on the material becomes as maddeningly uncertain as the data with which he must work. It's no fault of Jones'; the fault's with the data available. The very maddening mistiness of it is as fascinating, however, as the clarity of the preceding sections.

To consider logically the possibilities of extra-solar system worlds, something must be decided about the origin of the Solar System. On the basis of the System's origin, some logic could be built up as to the probable frequency of worlds. But no satisfactory explanation of the origin of our own planets is available—we don't know whether this is actually an expanding universe which may, at the time of the origin of the planets, have been very different. We don't know—

But if you're interested in a sound, complete discussion of extra-terrestrial life possibilities, this book is readable, clear, and about the most complete now extant. It's recommended.

J. W. C., JR.

THE OPPORTUNISTS

By E. A. Grosser

It was a magnificent, uplifting ideal when it started. The power to remake a world gone wrong. But somehow— the wrongness crept into the ideal and out of the world—

Illustrated by F. Kramer

DAN scuttled into the brush and crouched silently in the semidarkness. If he were seen, he carried his own death sentence under his arm. At the thought he clutched the book tighter.

The shabby volume was the one remaining treasure of the village, and their one hope that some day they might throw off the yoke of the Masters. No one in the village could understand the things the Elders called "words." But its possession gave them hope.

And now, someone must have told the Masters. Since the moment the field workers had spied the strange rolling house of the Masters— "autos," the Elders called them— the village had been like a disturbed ant hill. The one thought paramount in the minds of the villagers had been to save the book. The Elders had given the book to Dan and told him to hide. In every village there were a few whose births had purposefully not been recorded. Unaccountables, they were called. And Dan was an Unaccountable.

He listened intently. A nervous perspiration dampened his unyouthfully hardened body. His white skin had been sun and wind tanned to a deep bronze, but now he was almost pale. He heard a metallic bang, and knew that the Masters had got out of their auto and closed the door. Now the village folk would be lining up for the roll call. Dan looked more like an animal than a man, crouching in the brush, until he smiled. He was suddenly very glad that he was an Unaccountable.

Sometime later he heard another metallic bang, and he breathed more freely. The Masters had given up. Probably they thought the report had been made by a jealous trouble maker.

Dan crawled out of the brush and stood up. He was happy, walking to the village. Once again the Masters had been thwarted, even though they didn't know it.

He strode around the corner of a rude cabin and halted frozenly. The villagers were still lined up in the square. The Masters were still calling the roll. There were two autos, instead of one.

One of the Masters was reading the names from a great book; two others were near him, one on his left and one on his right, with their hands on their terrible "guns" that killed with a loud noise; and a fourth Master sat in the turret that rose like a bubble over the top of the auto, and his hands were on the even more terrible "stuttering gun."

Dan wanted to turn and run, but he knew that he didn't have a chance. The eyes of the Masters were on

"We had the chance—so we decided to play God!"
The old man shrugged. "It hasn't worked."

him. He straightened under their gaze, determined that if he had to die they wouldn't get any satisfaction out of his dying. Finally the Master with the great book asked:

"Are you Rolf? Is that the book?" Strangely, his voice wasn't threatening. It was cold, unemotional, but it was not the voice of a Master who speaks to a wrongdoer.

From the corner of his eye Dan saw Rolf start to speak, and he also saw the man next to Rolf press his knife to Rolf's back. With the few words from the Master they all knew the name of the traitor. But it would do no good. Dan knew that death was all he could expect. Even if he could explain his possession of a book, and it had never been done yet, there was still the fact that he was an Unaccountable.

The Master frowned. "Answer!" he commanded sharply.

Dan started to say, No, when his father stepped forward and interrupted. "His name is Dan Rolf," he said respectfully.

The Master turned. "And who are you?"

"His father . . . Master," the old man replied, and Dan could see that he choked on the title.

But luckily the Masters didn't notice. The Master with the great book that told him the names of all in the village turned again to Dan. He was smiling as he reached for the book.

"Two names, huh? It doesn't take you illiterates long to get ideas. It's a good thing you can't put them down in black and white and remember them." He looked at the book, then passed it to the Master on his left. "A book of short stories," he said. "I'm glad it wasn't 'Gone With the Wind.' I think I'm going to get hysterical the next time we scrape up a copy of that. They sure must have sold a lot of them just before the change."

He looked at his great book, then at the assembled villagers. He closed the book with a snap. "Oh, let's skip it! We've got the book."

They started toward the autos. "C'mon," said one to Dan. "You'll get your reward."

Dan stood motionless. He looked at the silent villagers, at his father, his mother, Elsa— Would he have to leave them?

The Masters got into the autos. The one who carried the great book looked at Dan severely, suspicion crept into his eyes. "Well? Don't you want to be a Novice . . . to become a Master?"

Dan went to the auto, got in, and held tightly to the seat as it moved away from the village. One of the Masters rolled down the glass window. Dan watched, marveling, and forgetting some of his fear.

"*Phew!*" said the Master. "Don't you fellows ever take baths?"

Dan reddened. "The . . . the river's awfully cold in winter," he mumbled.

"Lay off the kid!" commanded the Master who carried the book, then turned to Dan. "Never mind this fellow, Dan. He has the same effect on others, himself. You and the book will go to St. Louis: the book to the Central Library; and you'll get your hypos and training, and there will be a room and tub for you alone." The auto flashed over the ancient bridge and they caught a glimpse of the frozen surface. The Master shuddered. "I don't blame you; I'd never take one if I had to chop that ice first. Sometimes I think the Supreme Master overdoes it when he decrees that those poor clods can't have any metals except

one small knife. God! Think of having to cook with pottery!"

The other glanced at him and said nothing. The Master seemed to become uneasy. "But, of course, the Supreme Master has good reason for everything he does. And the Supreme Master is supreme!"

To Dan the words sounded like a recitation. He watched the others closely to discover all that he could. But the incident had dampened the spirits of the two Masters and they sped along in silence with the other car and the other pair following.

St. Louis was like a great monster, sprawling over the land. But it seemed to Dan that the monster was nearly dead. Wide, smoothly paved streets were nearly deserted. Only a few people were in the parks. It was a city for a million inhabitants, and in it lived only thousands. Dan liked his village and the barbaric simplicity much better. The city was something straight from the olden days and by its very emptiness made a person think always of the change.

He was taken to a hospital. A doctor injected a nearly colorless fluid into his arm, then a week later the injection was repeated. Dan felt sick and irritable for several days, then he recovered and was taken to another part of the city and assigned to classes in a large school.

Hour after hour of tedious drilling with fundamentals—day after day—weeks! And Dan learned to read! The time came when he could look at a book and see more in the print than a dirty page. The words came to mean something to him. He read voraciously.

He learned that the change was caused by something other than the Supreme Master. That the Supreme Master only became a Master and Supreme after the change. That a thing called the sleeping sickness had caused the change. For years it had been known, had been common, but not common enough to be accounted a menace. Then a new form of the sickness had swept out of the Great Lake region to the northeast and enveloped the world as a great plague. Transportation ceased—then communication. The frail civilization built up at a high cost in blood and sweat had tumbled. The new plague was not fatal. It was worse! It affected the mind. It paralyzed those centers concerned with reading. The entire world with the exception of the Masters was stricken with alexia.

And all the while the plague was sweeping the Earth the Supreme Master labored in his laboratory. He guarded himself and his coworkers as best he could, but the day came when they, too, caught the contagion. First one, then the other of the men became dependent entirely on memory, and found it unreliable for fine work.

Still the Supreme Master labored on. He infected animals, tried to develop a serum—tried immunization, but it didn't immunize. The plague settled down quietly to stay. It became endemic. And as more and more mistakes were made from faulty memories, barbarism engulfed the world.

The Supreme Master and one other labored alone. They succeeded in producing a serum and protected themselves. But they were alone, until they discovered that their serum would cure the alexia. It washed the brain of the last lingerings of the sickness and men and women became normal once again.

The awful power latent in their hands must have conceived the idea

of remaking the world—on different lines. The serum was developed further, but those who received its blessings were rigidly selected. A new world would be developed.

But something within Dan protested at the inequality. Many—nearly all—of the books were those printed before the change. And the world they spoke of so casually seemed to him infinitely more nearly right and just. But he hardly expected the Old Masters, and the sons and daughters of the Old Masters, and those informers who had become Masters to agree with him. So he kept his opinions to himself, and studied the harder.

DAN was reading in his room of the apartment house which was used by the Advanced Novitiates as a barrack. The door opened and he looked up with irritation. His room was his, alone. Privacy was a privilege.

"H'lo, kid," greeted the man standing in the doorway.

Dan recognized him. It was the Master who had carried the great book at the village, and who had reprimanded the other Master.

Dan crossed the room with outstretched hand, smiling. "I'm glad to see you! How did you ever get down here?" Then he halted uncertainly as the other released his hand. "You know," he said, "I never did know your name."

The other laughed. "Harker," he informed. "And I came down for my semiannual needling. It's supposed to be good for a year, but I'm taking no chances. Then I had to bring in the collected books and the new servant quota from the mountains. I thought I'd look you up, to see how you were coming along. I see you can read, anyway." He nodded toward the well-filled bookcase and the open book on the table.

Dan nodded. "Any from my village?" he asked.

"Three," Harker replied, then pulled a book out of his pocket and offered it to Dan. "Here's my excuse for coming. I thought you might like to read it. It's the book you turned in—a bunch of short stories, none of them very good—though one's got an idea that would play hell with us if any of the illiterates caught on. Plot hinges on a guy putting sugar in gasoline to prevent its vaporizing. Wouldn't that play hell with us while we're still using stocks made before the change, and most of that concentrated right here at St. Louis?"

"Yeah," Dan agreed absently. "What are the names of the three?"

"The three what? Oh, you mean the illiterates! I always pick the best-looking . . . trio of beauts named Joan, Elsa, and Margy. Take Joan if you want one—the last two are wild cats."

Dan paled, but said nothing. Somehow he had always known it would happen. Elsa was too pretty to hide forever in a village when the Masters always chose that type. He fought to hold his anger in check. One unconsidered move and—

"What's the matter, Dan? You look sick."

"I am. Elsa and I were going to be married."

Harker tossed the book to the table. Dan smiled bitterly when he remembered with what care the village had protected the book. Harker gripped his shoulder.

"I'm sorry," he said sincerely. "If I'd known—"

"Oh, it would have happened sooner or later."

"Why don't you put in a claim for her?"

"Me? A Novice?"

"Yeah! That's right; I forgot you haven't the right yet. And I can't because I'm married. Judy'd raise hell."

"Maybe she'd never find out," Dan suggested.

Harker snorted. "She's here with me. I tried to tell her she should trust me, but she just took one look at that trio and packed her things."

Dan cursed. "I'll smash this Master business if—"

"*Shh!* For God's sake, kid! Be quiet or you'll find yourself at the end of a rope . . . the wrong end."

"It would—"

"Shut up!" Harker snapped. "Now," he continued when Dan was silent, "I was going to suggest that you come with me and explain to Judy and maybe we can work it."

HARKER had taken rooms in one of the few hotels being maintained. He and Dan took the elevator and were admitted to the suite by Judy herself. Dan looked at the middle-aged blonde and quit hoping. She looked hard, unsympathetic. But, nevertheless, he pleaded his case.

When he finished, Judy reached out and patted his hand. "You poor kids," she said, sniffing. "It's just like a book. Sure we'll do that for you, and anything else that we can." She turned to Harker and completed harshly, "And if I catch you making a pass at the girl, I'll scalp you!"

Harker took Dan's arm and hastily ushered him out of the room. "That woman's a devil," he muttered when they were walking down the hall to the elevators. "Well, you beat it on home, and I'll attend to the business. I'll bring her around to see you as soon as I can . . . or rather, probably Judy will."

Dan returned to his room, but there was no more studying that night. The protest that had lain quietly in his mind for weeks, had suddenly become an aching, burning thing. This "new world"! It was not a new world! It was but a filthy fungoid growth arising from the rotting remnants of the old.

He remembered what Harker had said—"most of the gasoline stored at St. Louis . . . not producing any . . . sugar prevents vaporization." If a person were to pollute the storage tanks this "new world" would collapse before it could produce sufficient supplies of its own. Dan read the story, then chuckled. Maybe he and those illiterate villagers hadn't been so far wrong after all in believing they had possessed the way to freedom.

The next morning he went to his classes with a new determination. But it was hard to concentrate when a phantom face with dark, sparkling eyes and a quick-curving mouth persisted in interfering with his sight. He tried to call Harker twice, but could get no answer. Before starting for his room he tried again and was rewarded with the same results.

But when he got home he found Harker waiting. Something in the older man's expression warned him. He waited.

"Well?" he prompted.

"I'm sorry, Dan. Sorry as hell. But I couldn't put it over. I tried, but she has been assigned to the laboratory and I couldn't do a thing."

"Laboratory? What do they want with her there?"

"God only knows," Harker replied, turning away to look out the window.

Dan's fingers closed on his shoulder like clamps. He pulled the older man around so he could look into his eyes.

"Harker," he said, "you don't like this system any more than I do . . . do you?"

Harker said nothing for a full five seconds. Then he said, "Don't talk so damn loud."

Dan relaxed a little, almost smiled. "I thought not," he said. "I don't know your reasons, but I had a hunch as soon as you came here with that book . . . and said what you did."

"Well, go on," urged Harker.

"I'm going to get Elsa out of here, and wreck this whole pretty scheme of the Masters.

"Are you with me?"

Harker hesitated. It seemed to Dan that the other's mind was working with lightning rapidity, but nothing of the thoughts showed on the man's face. "Well?" he prompted.

"Others have the same idea," Harker said in a low voice, "about the 'new world,' I mean."

Dan's face was a personified question. He waited.

"I have been feeling you out," Harker went on. "I've been wondering if you wouldn't like to join us. We are ready to strike."

"When?"

"Are you with us? Remember Elsa—"

"You know I am."

"O. K.! You'll help me. I'm on one of the trucks and we're going to the warehouses, then to the tank farm—at three tomorrow morning. Be ready."

"The sugar trick?" Dan asked as Harker started toward the door.

Harked nodded. "And be ready," he repeated. "We're short of men and need every hand we can get."

Once Harker was gone, Dan's thoughts centered on Elsa. What good would it do her if the revolt was staged tomorrow morning. She needed help now.

He went to the window. It was dusk, soon it would be dark. He resolved to break the strict curfew law. Somehow—in some way—he must find a way to enter the laboratory building. It would be barely possible after dark. There were few guards.

He waited impatiently and wished that the days were as short as they had been four months ago in midwinter. Spring had its peculiar disadvantages and right now the worst seemed the increased number of daylight hours.

He crept down the fire escape stealthily. It was only seven thirty, but he hadn't been able to wait longer. The last flight of steel stairs —the one that lowered automatically with his weight—screeched horribly. He leaped to the pavement and fled to the darkness of an alley.

There he waited until he felt sure that no one had heard, then he started toward the Medical Center. A dozen times he dodged into the protecting darknesses, and was glad that this "new world" hadn't yet acquired the efficiency necessary to keep the streets well lighted.

At last he came in sight of the Medical Center, a huge building that had once been a hospital, but with the decrease in population many of the hospitals had become unnecessary and this had been devoted to research and the preparation of supplies. There was only one pair of guards that Dan could see, but then, there was only one entrance that he could see.

He didn't even consider trying to pass the guards, but instead, crept

along the shadowed street a hundred and fifty yards farther, waited until neither was looking in his direction, then dashed across the strip of lawn to the shrubbery that surrounded the building. He crept stealthily around the building toward the back, and the action brought to his mind the memory of the last time he had engaged in a similar occupation. He prayed that this adventure wouldn't end so disconcertingly as that had.

He found the rear entrance easily enough, but just in time, saw the guard stationed there. He was waiting for the fellow to turn away so he could make a rush, when he saw a second guard move restlessly in the shadows near the poorly lighted doorway.

No chance there either! He felt confident that he could handle a single guard silently, but a second guard would give the alarm. And if they turned out the guard to look for him, he wouldn't have a chance. He crept back the way he had come.

There had been several lighted windows, but he avoided them and tried those of the rooms in darkness. But all were possessed of excellent screens and he wasn't even able to reach the glass.

DAN stood up cautiously, hoping his clothes would blend with the neutral colored building, and peered through one of the lighted windows. The room was empty, but the screen was securely fastened. He heard the murmur of voices and crouched low again. Finally he concluded that the voices were coming from the next lighted window and went to that.

He peered inside cautiously, then stared. An old man was busy at a workbench and doing all the talking, but Dan stared at the young woman who was helping. It was Elsa.

"Now, my dear," said the old man, "get me a flask of distilled water; it is in the bottle marked 'H'—that's two straight lines up and down, connected by a shorter, horizontal line . . . 2—that's the snaky-looking line that can't make up its mind which way to go, and it's at the bottom of the 'H'—"

"I know," said Elsa eagerly. "O . . . the flattened circle that's balanced on end."

"Good!" the old man approved, beaming. "You are learning fast. I think this is an excellent way to learn letters and numbers. I'd tell the council, if they weren't running such a dirty business. I had no idea it would all turn out like this. If I had . . . well, it *has*, so there's no use talking about it. Oust *me*, will they? But I forget—they *did*. That was day before yesterday, or was it the day before that? Well, it doesn't matter! I'll show the little nincompoops! So they won't even listen to my reports any more! Well, let's drop the subject. Anger only shortens a person's life. Now, if you will give me the distilled water . . . no, never mind the flask; make it a beaker—I'm thirsty."

Elsa opened the bottle and tipped the cradle to fill the beaker. Dan looked closer at the window. It was ajar, practically open, but the screen was latched. He lifted his eyes to see the old man drinking thirstily, and then looked directly into Elsa's eyes. Her lips parted; eyes widened.

"Ah-h!" said the old man when he finished. "Best water you can get; no bugs in it . . . that is, not many. Do you know, my dear, that absolutely *pure* water can be considered a fabulous substance; that

no matter . . . What's the trouble?"

He turned to follow her gaze. Dan ducked and waited, cursing, for the alarm. But none came. He heard the old man repeat his question, and heard Elsa say, "I . . . I thought I saw that . . . that young man I was telling you about."

The old man chuckled. "It's spring, my dear. But it's too bad it wasn't he. We could unlatch the screen and invite him inside where the night patrol wouldn't bother him. Almost like Romeo and Juliet, isn't it? Ah, love is a wonderful thing, and so is spring. I remember once when I was teaching at the Advanced Masters School. I was forty and just getting my second wind . . . My dear, there *is* someone out there. I distinctly heard a scraping then. See if it's Romeo!"

A moment later Dan heard the window open wide and the latch of the screen click open.

"And if it is—ask him in," called the old man. "From your story he must be a combination of Hercules, Apollo, and a few other Greek gods . . . must have an extremely interesting character."

The old man sounded harmless enough. Dan decided to risk the chance and stood up.

"Dan!" cried Elsa.

"So it *is* he!" exclaimed the old man. "Snatch him in and I'll play Cupid for a while."

Dan scrambled over the window sill and gathered Elsa into his arms. His lips sought hers hungrily. The old man watched shamelessly, and with great enjoyment.

AT LAST he could remain quiet no longer. "That reminds me—" he started.

Dan looked at the old man. "Who's he?" he asked Elsa.

"He was a member of the council, but they kicked him out when he tried to prove to them that the plague was losing its virulence. That the illiterates were becoming immune."

"Called me senile, they did," interjected the old man aggrievedly. "Hell! Sure I am! I'm nearly a hundred! But I still got more sense than the lot of them put together. I had sense enough forty years ago to see that things weren't working out as we had planned. I wanted to call the whole thing off, but they wouldn't let me. And their sons are still worse."

"You don't like the Masters, either?"

"Nope! I hate 'em all . . . even myself at times. It was a dirty business. Science should not be prostituted. But we had big ideas for a new world with no wars, and no poverty. But things never seem to work out as you plan them."

"Are you sure that the illiterates are becoming immune?" Dan asked doubtfully.

The old man pointed jubilantly to Elsa. "She's learning to read," he cackled, "and she never had any of that damn serum."

Dan looked to Elsa for confirmation. She nodded.

"It's true, Dan."

Dan turned back to the old man. "And you really hate the Masters' rule?" he asked.

"Yep! And them, too!"

"Then we've got work to do," said Dan, crossing to the door and peering out on the hall. "This artificial protection of the Masters has kept them from becoming immune and all we have to do is destroy every drop of the supply and beat it."

"Eh? What's that, young man? Destroy? There's been too much

of that already. Besides they'd notice it and prepare a new supply."

"You're right," admitted Dan. "It would be useless. The idea's no good."

"Yes, it is, young man; yes, it is," the old fellow argued. "But it lacks finesse—the finish that comes with age. Now, we can destroy the supply and replace it with something else that won't work! How's that?" He beamed, waiting for approval.

"Rotten," grinned Dan. "They'd notice that, too. It wouldn't react."

"Oh, but the stuff I give them *will*. I'll fix something that will make them as sick as dogs—and I'll be sure not to use any myself. That'd be foolish, wouldn't it?"

"Yeah," Dan agreed dryly. "Let's start."

"Fine! Fine! Come right this way; I know where it is kept. I know where everything is kept. I've been around here longer than any of those little nincompoops and know more than all of them put together. We'll fix them. We'll fix the whole mess . . . just like I wanted to do forty years ago."

DAN and Elsa followed the old man down the corridor to the main laboratory and they brought out the serum. They smashed the delicate containers heartlessly, sent the contents down the drain and the glass into a box for later disposal. Then they began the long, tedious task of preparing facsimiles containing a substance which the old man gleefully guaranteed to be semideadly. At two, they were finished, and the old man leaned back against a workbench and surveyed their accomplishment.

"Should have been done forty years ago," he muttered. "We thought we would be supermen, but we weren't; we were just a bunch of lousy opportunists enslaving men."

Dan glanced up at the clock, remembered Harker. "I've got to go," he said quickly. "Harker and I will put on the finishing touch before morning."

"It's finished now," stated the old man positively. "Summer is coming and that is always the critical period."

"But every little bit helps," said Dan, kissing Elsa. "I'll come back tomorrow night and we'll steal a car and leave."

The old man watched them, chuckling reminiscently, then when Dan had opened the window and started out, he asked, "What was that name?"

Dan dropped to the ground outside and looked back at the old man suspiciously. Then his suspicion faded. It was absolutely without cause. The old man had demonstrated his worth.

"Harker," he said, and disappeared into the night.

The old man turned to the box of broken glass, lifted it to take it away, then dropped the box with a curse.

"Call him back! Call him back!" he ordered Elsa.

Unquestioningly Elsa ran to the window, looked out and called as loudly as she dared. But there was no answer. She called again, then the old man was insisting that she come with him.

He moved rapidly toward the entrance, despite his age, and Elsa was forced to run at times to keep up with him.

"Wh-what's the matter?" she gasped.

"I thought that name was familiar. Damn my memory! There's a major of the secret police named Harker; usually he acts as an *agent provocateur*."

Dan sped through the darkened streets toward home. He arrived far ahead of the appointed time for his meeting with Harker, and then had to wait nervously in his room.

Harker arrived on the dot. Dan opened the door in response to the gentle rapping.

"Hurry," whispered Harker, "but don't make any noise. Mustn't disturb others."

"O. K.," answered Dan, fastening the belt of his coat and following Harker into the hall. Silently they went down, using the stairs. A small truck stood at the curb, with a man standing on the running board. He leaped to the sidewalk when they approached.

Harker made no introductions, but climbed behind the wheel, growling, "Get in the middle, Dan."

He started the auto smoothly and they sped along the silent streets. The motion seemed to awaken Harker's tongue.

"At last the Masters are going to get what they deserve," he said, as though to start the conversation.

"Yep," agreed Dan. "It'll sure play hell with them if it works. But it sounds almost too simple. I'm glad it isn't our only—"

"O. K., Jones," Harker cut in. "You heard it. Did you get the record?"

"Sure thing."

"Put the cuffs on him then. Use your gun butt on him if he gets tough. Don't take any chances shooting in here. That'll come at dawn."

Dan looked from one to the other and the steel clicked securely around his wrists before he was fully awake to the situation. Then it was useless to struggle.

"But the sugar—in the gasoline?" he protested.

Harker laughed harshly. "I've used that a dozen times and it's good for a dozen more. We always test the Novices this way. Put some illiterate they might love on the spot —then show them a way to gum up the works. It might work, at that. It does in smaller quantities."

"B-but Judy . . . what about her?"

"That is one of my few mistakes," Harker said. "I told you she was a devil, and she's got her hooks in me and won't let go. Some day, though, I'll be able to figure a way out."

Dan relapsed into silence. He could see no reason for hope, and felt none. Only one thing was there for which he was glad—Harker had interrupted before he could tell about the serum. The Masters would not for long be Masters.

He smiled bitterly when he found the old man and Elsa waiting at the station. And he discarded even that last comfort. And with it gone and Elsa working with him, he found that he no longer cared much.

The old man stepped forward briskly. "Good work, major," he congratulated. "I'll take charge of the prisoner."

"But—" Harker started to object. The old man straightened a full two inches and Harker collapsed. "Yes, sir," he said meekly. "It shall be as you wish, Master. The prisoner is yours."

"I want a pistol, too," demanded the old man. "And the keys."

He received the weapon promptly and threatened Dan with it. "Now, march!" he commanded. "You should make a good specimen."

Elsa followed them outside, eying the old one a bit anxiously. She hoped the fellow was only an excellent actor, but things had been too smooth for him to be of any aid to them. His integrity must be considered beyond question.

They halted at the side of a fast speedster. The old man unlocked the cuffs and handed Dan the pistol, chuckling.

"Take it before there's an accident. And get in this auto and head for your hills."

"You're going to let us go?" said Elsa.

"Sure, what did you think?"

"Who are you?" asked Dan.

"I used to be Supreme Master, until day before yesterday . . . or was it the day before that? Damn my memory! Maybe a good touch of the plague will do me good . . . can't do much harm anyway."

"Then you started all this?" questioned Dan.

The old man nodded. "But for the last forty years I've been only a figurehead for their dirty work. Anyway, we are finishing the whole mess now."

"Why don't you come with us?" asked Elsa from the auto, and Dan halted to second the invitation.

"Nope. I'm too old," he said regretfully and watched Dan get behind the wheel. Dan was wondering anxiously whether or not his few weeks' training would prove sufficient to cope with the machine. He started the engine cautiously, and felt an increasing confidence with his success. He looked up at the old man with a grin. "Good-by."

"Wait a minute!" cried the old fellow. "I'll tell you . . . you come back next year and teach me how to read, and I'll see if I can't get my third wind. And bring the youngster, too," he concluded with a leering cackle.

THE END.

DOOM SHIP

By Harry Walton

The ship was done, half wrecked, and her crew was done. Outcasts, the useless dregs. And the ship was bound for the Sun—though that wasn't her official port of call!

Illustrated by Schneeman

"Hey, you!"

Garth turned slowly. It had been a long time since anybody had taken the trouble to call him, even that way. He wasn't sure the shout was meant for him.

"Want a berth?" asked the dim figure on the landing-stage platform.

The bitterness of disappointment welled up like acid in Garth's mind. How often he had heard those words, that were only the prelude to an oft-rehearsed farce. He knew it by heart now and had no desire to undergo another performance.

"Yeah," said Garth. "I want a berth, but I can't pass a physical."

He expected the man above to turn away at that. The man stayed. He said: "We got kind of a good doctor on board. Maybe he'll pass you. Come on up."

Garth stood still, swaying a little as men of his kind did. Pass him on a physical? Not a chance.

"He won't pass me," he called up.

The shadowy figure silhouetted against the ship's open port gestured impatiently.

"You got nothing to lose by trying. We pay five credits anyway if you're rejected. Come on."

That was different. The bitterness in Garth gave way to anticipation. He licked his dry, feverish lips. Five credits would cool them for a while. Five credits would still a little of the raging hunger within him. He'd be rejected, of course.

He swung up the stairway to the landing stage. An old-fashioned fluorescent farther up the cradle shed pale light on the ship's hull. The paint on her was thin, scratched by a thousand forgotten impacts, so that you could hardly read her name and origin. *Carlyle Castle*—Tarma, V. A freighter, of course. Garth had never heard of her, but obviously she was a veteran and in urgent need of hands to offer five credits on rejections.

The man, who wore a second mate's stars, motioned him through the port and into a grille-floored corridor with steel walls even barer of paint than the hull. Their footsteps woke echoes from the dim depths. You could look down through the floor, through a maze of metal, and count three levels; four in all, because this was the upper deck. Earth built, she was, Garth thought. Off the Martian run, perhaps, and reregistered here on Venus for third-class freight service. What difference did it make? *He* wasn't sailing on her.

He looked at the second mate, a gorillalike brute in build, with a face to match, and was almost glad he wasn't sailing. Garth could read faces, and he knew this was a man he wouldn't have tolerated for a sin-

This sluggard, underpowered ship could never escape now. The Sun's mighty gravity already bound her to death—

gle watch on his ship. And then self-contempt twisted his lips in a wry grimace. *His* ship! He'd never have a ship again. Gale Garth was through. Not an owner in the system would intrust so much as a tender to him. Even the hulking second mate walking beside him would be accounted worth ten of his kind.

In the main saloon three men waited. One, wearing the single star of a captain, sat behind a battered table littered with papers. Two others in mufti stood by, cigarettes clamped between their lips; one had a stethoscope dangling from his neck. Garth took no further notice of them. The rest would be routine, with perhaps a kick or a curse when they learned what he was.

"Name?" snapped the captain.

"Gale Garth."

"What was your last ship?"

"*Stellar Queen*. Jupiter run."

"Doctor, examine this man."

The doctor came negligently forward, ran the stethoscope over Garth's chest in a perfunctory manner, then stepped back while Garth, obeying the mumbled command, took off his shirt. Now they'd know—

There was a gasp from the doctor as he caught sight of the characteristically indrawn stomach, the ribs starkly plain beneath the pallid, glossy skin.

"When did you eat last?" he asked sharply.

They found out quicker now, Garth thought. But it made no difference. He hadn't expected to pass —just to get the five credits.

"Two years ago," he answered, and was conscious of the third man taking the cigarette from his mouth in astonishment.

But the doctor reacted otherwise. Rage contorted his face. His fist came up threateningly, and Garth stumbled backward with a scream of terror that welled up from his very soul. The fist dropped harmlessly to the doctor's side. He swung toward the table. "This man's a dewlog drinker, captain. His basic metabolism has been radically altered by the drug—and he hasn't the courage of a cornered rat. He may live five years, certainly no more, unless he quits the stuff."

"This voyage," said the captain dryly, "won't last any five years. Will you pass him?"

Garth, astonished, saw the doctor nod. "With the reservations mentioned. But he'll be no good to you without dewlog. You'll have him in a sick bay half the time."

The captain only grinned wolfishly. He was of the same type as the mate, with perhaps just enough additional intelligence to get a third-class master's certificate.

"Look sharp, man," the gruff voice aroused him. "Your papers?"

Bewildered, Garth shook his head. Didn't they know a dewlog drinker couldn't get papers at any clearance port in the system? He hadn't had any for two years. And without papers you couldn't get a berth even on a fourth-rate tramp such as this.

"Found them in his shirt, captain," said the third man, who had been silent up to now. He flung a stained packet on the table.

Garth watched in stunned amazement as the captain unwrapped it, spread out the stamped and sealed voucher of a certified spaceman. Incredulously he read his own name in the spaces provided; and, ending a list of ships, the name *Stellar Queen*. Then he remembered that the captain hadn't asked questions in the usual order, and that the third man had turned aside to write something when the doctor came forward.

"Why the hell," the captain wanted to know, "don't you spacehogs sign your papers? I can't accept them this way."

The room reeled about Garth. Through a haze he saw the captain leering at him, holding up a pen. Without meaning to do so, he took it, scrawled his signature twice beneath the master's stubby thumb. He'd dreamed of this hopelessly for so long he would have done it in his sleep.

"You're signed on. Get your equipment from the slop chest and find a bunk forward," said the captain.

IT WAS like a pailful of cold water in his fevered face. Garth had expected anything but this, anything but being provided with bogus papers, passed on the physical, and signed on immediately. A cold chill of realization came over him; he was no longer fit to take a berth. A year

ago it could have been the salvation of him. Now it meant torture. Nausea shook him when he thought what it meant—going for weeks without the stuff that was meat and drink to him, vomiting up ordinary food because his atrophied stomach couldn't handle it, while his nerves shrieked for the anodyne denied them.

"I can't go," he gasped. "The doc's right—I'm no good without dewlog. I'd go crazy without it. I only came up for the five credits on rejection."

"You're signed on," the master repeated. "Mercury voyage. Go forward."

Terror lent Garth a sort of courage. "Even if you have me legally, captain, you're better off without me. I can't face a voyage any more. I'd be a liability. You're better off to go short-handed than to take me."

"I'll be the judge of that," snarled the master. "Now go forward—or we'll have a little discipline here."

Garth looked about wildly. The second mate had stepped close to him. The doctor looked stonily into space. The third man blocked the doorway. He was trapped.

"You want to go forward?" asked the mate with a cold grin. "Or you want a little discipline?"

His hand came up, clenched into a hard, knotted fist. Garth stared at it while horror welled up in his mind —the horror a normal man sees in the knout or the rack. For to Garth's dewlog-sodden, abnormally sensitive nerves, all pain was multiplied a hundredfold. A scratch or pinch was agony. A blow—

He went forward, the mate following. Automatically, his horror-numbed senses took note of things that were not as they should be—rotted fire hose in the corridor racks, broken valves, dogs missing from the bulkhead doors, torn gaskets, and a dozen lesser evidences of neglect.

The mate stopped, flung aside a wall panel that covered a mess of tangled clothing, shoes, and safety belts.

"Pick 'em out. Sharp, now."

Garth pawed the stuff over. The uniforms were filthy, faded, patched things. Most of the shoes lacked soles. He found a passable outfit, but the safety belts were grained, cracked, worn-out. It would be as much as your life was worth to trust any of them in an emergency. He flung them aside.

But the mate threw one on top of his bundle. "Regulations. You don't have to use it if you don't want to. Come on." The panel snapped shut, they trudged through more corridors, brought up in what was evidently the crew's quarters, a huge, dirty cubicle with bunks ranged about the walls two deep. Four of them were occupied by motionless, blanketed figures.

"Tired?" asked the mate with mock solicitude. "You look it. Ain't been getting enough sleep. We'll fix that—"

Garth looked at him in astonishment that turned to terror when he understood the leer upon the mate's face. He screamed as the other advanced, fists swinging. The cry bubbled in his throat as hard-swung knuckles exploded against his chin. Then came merciful darkness of body and mind.

"Hi, waddies. Wot d'yuh know? The stiff's comin' to now, 'e is."

Garth heard the words, a shuffle of feet, and the muted, hull-transmitted roar of rocket motors all in the same instant of awakening. He felt spent and feverish, which was not strange, considering the fact that he had taken no dewlog for forty-

eight hours before getting on board. He opened his eyes to the bunk wall, and a sputtering little flourescent that winked constantly with the twenty-cycle delivery of the lighting generators. He turned his head and looked into a face as dark and wizened as a monkey's.

"Hullo," said the face, cracked by a tooth-revealing grin. "From the way yuh were snoozin', I thought yuh were either dead or Pedersen must of sung yuh a lullaby."

"Who's that?" asked Garth thickly, sitting up.

"Yuh don't know?" inquired monkey-face. "The second mate, old bull-face. The captain's name is Dickby."

Sharp memories surged back. Garth came out of the bunk standing, swaying slightly, instantly aware of the change to artificial gravity. "The clearance inspector—he been on board?"

Monkey-face chuckled. "Sure 'e was—hours ago. Found all shipshape and regulation—what 'e saw, leastwise. We're cleared for Mercury, waddy."

"Mercury!" snarled a new voice. "Cleared for hell, you mean. Tell him the truth, Jonkin."

Garth looked at the speaker, a lean, tall, hard-set man of indeterminate age, swarthy and almost bald. From ear to chin, a long scar lent character to an already unusual face. Black eyes burned tragically in deep-sunk sockets. A man sunk below his station, Garth thought, like himself.

"What does he mean?" he asked the wizened little man, Jonkin.

"Mean? 'E don't mean nothin' that 'e knows of. That's the Croaker, as we call 'im. Croaker Holt. A year he's been on this ship, an' still he's croakin'. Don't pay 'im no mind, waddy."

"This voyage's different," snarled Holt. "You know it is. Mercury! Think they'll miss that chance? This is the trip."

Jonkin shrugged his shoulders, turned his back on the tall man. "Wot's yuhr name, waddy?"

"Garth."

There was a silence, as though he might wish to say more.

Then Jonkin spoke again, dryly: "Thanks for tellin' us the story of yuhr life. Guess we each have a story that we're not so anxious to tell. It's mess time. Comin'?"

Garth surprised Holt's eyes upon him. "Guess so. Nobody's assigned me a watch yet."

Jonkin grunted, led the way. Others in the bunkroom followed. At the mess table they sat down in two long rows.

Garth looked them over as curiously as they did him. Port sweepings, he decided, and worse. Shifty-eyed, drink-sodden, apathy and hopelessness in their every glance and gesture. A crew he wouldn't have put out of port with in the old days. He himself was no better—yet the captain had refused to release him. Why? Why should any master deliberately burden himself with such a set of men?

A burly ruffian entered from the galley, deposited a steaming kettle upon the table and vanished. There was a flurry of arms, metal plates, and spoons as the kettle was slid along. Garth filled his dish with a smelly mixture of flour, shredded meat, and less recognizable ingredients.

"Swill, that's what it is," growled Jonkin at his elbow. "All we get on this tub is swill and dishwater."

But Jonkin heaped his plate and proceeded wolfishly to devour the stuff, while Garth's shrunken stomach did flipflops within him. Sooner or later, of course, he would have to

eat. He took up a spoon and toyed with the food Holt's eyes were upon him again, burning, speculative.

Garth forced the stuff into his mouth. Every instinct, natural as well as drug-born, urged him to spit it out. He couldn't bring himself to chew it, but swallowed wryly and put in a second spoonful. On the sixth he gagged, and then in panic rose sharply from the bench.

"Second door to yuhr right," Jonkin remarked matter-of-factly, and Garth hastened off as directed, followed only by a few brief, uninterested stares.

Getting rid of what he'd eaten didn't help much. He was still feverish, but only dewlog could remedy that. When he got back to the corridor it was to encounter the burly second mate, Pedersen.

"Up and about, hey?" said the latter, smiling at him unpleasantly. "Maybe, after all the rest you've had, you're ready for work. Come along, sharp."

GARTH followed him down two steel-runged ladders, along a corridor that ran the length of the ship, into a shallow, drum-shaped chamber that was a maze of trusses and thrust girders. The circular rear wall against which these abutted was studded with two-foot pressure disks, from behind which issued the thunderous roar of blasting rockets. The chamber was a bedlam of sound; trusses danced with vibration. In the air was the reek of hot metal and leaking combustion gases.

Still grinning, the mate opened an equipment cabinet, drew forth a portable motor, a wrench, and a droplight at the end of a long cord.

"Series F rockets," he roared above the din, "have been choking under blast. They're shut off now. You know what to do?"

Garth nodded, licked his dry lips. Regulations required that all the tubes be shut off before a man be sent into any of them to brush off the carbon deposits. But the *Carlyle Castle* was beyond regulations now.

The mate threw the wrench down. "Get going. We can't get our speed without those tubes. I'll look in later."

He disappeared, slamming the bulkhead door behind him, leaving Garth alone in the fume-laden rocket chamber. That was against regulations, too. Two men should have been here. It was too easy for one alone to succumb to monoxide and heat. His head was already reeling, but he clamped the wrench over a capscrew, forced it protestingly around. When all twelve on the first disk were out, he lifted the hot pressure plate off its studs. Choking fumes swirled back out of the tube. He attacked another disk to give the first tube time to clear. By the time he had all six off he was staggering with weakness born of hunger, heat, and the omnipresent monoxide gases.

The motor sputtered rather badly, and its wire scratch-brush ran sadly out of tune. He dragged it and the droplight with him as he crawled into the first tube. There was room to creep—none to turn around in. Ahead, the throat narrowed down, although still farther aft it flared again into a narrow taper. The place was an oven, heated even through the refractory casing by the rockets still operating. From aft, where the space end of the tube was sealed by an automatically seating plug, came the thin hiss of escaping air. The plug wasn't seating perfectly.

He started the noisy motor, set to work in the narrow throat of the tube. The wheel bit into the sooty,

inch-thick deposit. Carbon dust clouded before his face, bit his throat. The *Stellar Queen* had had automatic machinery for this work. But this wasn't the *Stellar Queen*.

His head was filled with a surging ache. His drug-ridden body shrieked protest against its cramped position. In a haze of near delirium he swept the brush around. The rackety little motor drowned out the hissing aft. Slowly he worked backward—and suddenly, above the noise of the motor, came a squeal of twisted, torn metal and a roar of outrushing air. A terrific blast hurled Garth aft, headfirst. He had a momentary glimpse, through the stern end of the tube, of coal-black sky and hotly bright stars. Then he was fighting for his life. He knew that the safety plug had blown, that the tube was open to space. Air shrieked past him—the ship's atmosphere escaping into vacuum. Carbon crusts tore his fingers as he clutched madly for handholds. Little by little he was being pushed into the throat of the tube. Once past that, he would be blown into space like a bullet from a rifle barrel.

The blast inched him relentlessly aft, despite his struggles. His head was in the narrowed throat. He braced arms and shoulders against the rim just behind it. A hurricane of air held him spread-eagled, tore the breath from him, filled his head with a roaring cataract of sound. The narrow circle of sky visible through the tube reeled and blurred before his buffeted senses.

There were voices behind him, faint and far off. Semisuffocation was fast robbing him of consciousness, for his lungs could get no air from that shrieking blast. Every fiber of his beaten body cried for surrender, for the instantaneous death of space rather than this. The circle of sky was gone in a reeling chaos of pain and darkness.

Something clutched his ankles and tugged mightily. He felt himself drawn back, the crushing weight on his arms lifted. Air roared past him as he was pulled over the lip of the tube and lifted to the floor. There was the clang of the pressure plate being replaced.

He never knew whether he had or hadn't lost consciousness. Blurred pictures of the monkey-faced little Jonkin bending over him, and of another man he didn't know, and Pedersen. Greater than any of these loomed pain, dewlog sharpened. His chest ached viciously. His lacerated hands burned as though dipped into acid. His skull felt as though about to explode.

"'E'll live," came Jonkin's squeaky voice, "but it was a close thing, no mistake."

Jonkin lifted Garth's head and let a burning trickle of fluid flow into his mouth. The stuff almost choked Garth, but he saw then that he was back in the bunkroom, and that the stranger was a towheaded youngish man wearing the twin stars of a first mate—a very different sort from Pedersen.

"Glad to see you coming around," said the mate. "No need to talk now. Stay here a watch or two."

"Yuh got 'im to thank, waddy," put in Jonkin. "'E come a-runnin' and found yuh like a cork in a bottle. Pedersen was all for clampin' back the plate and lettin' yuh go, to save air. But not Mr. Denham, here. 'E made us haul you out."

"That'll do, Jonkin," said Denham. "I'm glad we got there in time, Garth. The air circulators tripped an alarm when the plug blew; and, of course, the instruments told us where the leak was. No harm

done, and we can spare the air well enough."

He nodded pleasantly and left, Jonkin following him, while Garth sank into a coma of fatigue and weakness which mercifully dulled the pains within him.

FROM that inauspicious beginning, life aboard the *Carlyle Castle* settled into a routine. Garth was grateful to be assigned to Denham's watch, and so to escape the rawhiding which Pedersen would have dealt him. Sinister as the ship had first seemed, it was apparently neither better nor worse than many similar tramps, poorly manned and equipped, which scoured the space lanes with cargoes that other vessels couldn't afford to handle.

From very necessity Garth learned, although not without spasms of weakness that kept him in his bunk a great deal at first, to assimilate the starchy, ill-cooked food served to the crew. Denham showed himself more than tolerant, and never drove him beyond endurance. In gratitude, Garth drove himself, resisting the onslaughts of his abnormal hunger so far as he could. Slowly the fever induced by lack of dewlog sank, as his metabolism swung back toward normal. He began even to think of reclaiming the life he had lost on that last voyage of the *Stellar Queen*. But at such times he wondered whether, with money in his pocket and dewlog available, he would resist the temptation of the drug. Even now the craving was at times so strong he would scarcely have stopped at murder to obtain the stuff.

"I've been given to understand that you were a dewlog drinker, Garth," the first mate once said. "You don't look like a man to adopt the habit deliberately. Accident?"

Denham's manner relieved the question of all offensiveness, and Garth was grateful both for his use of the past tense and for the benefit of doubt which Denham accorded him.

"Yes, sir," he answered. "I sailed on the *Stellar Queen* for Jupiter. Asteroid pierced our fuel tanks and set us adrift. It was eighteen months before a patrol found us out there—not like the heavily traveled inner orbits, you know. Two thirds of us were gone by then—starvation. The rest of us were kept alive by some bottled stuff we'd found smuggled aboard. If we had found it sooner, everybody could have survived—in a fashion. It was dewlog. You don't leave dewlog alone after living on it for three months. But it saved our lives."

Denham nodded. There were a few other stories of addicts made through similar circumstances. But Garth kept to himself the additional fact that he had been, not a spaceman, but captain of the ill-fated *Stellar Queen*.

Of all the ship's crew, Holt remained a mystery—or perhaps it was Holt's manner rather than the man himself. He watched Garth with furtive interest, and more than once seemed on the point of making confidences which failed to materialize.

THE *Carlyle Castle* was well past the midpoint between the orbits of Venus and Mercury, and sweeping in a great spiral toward the latter planet, when Holt and Garth were told off to break out some cases of supplies in the cargo hold. To get at the boxes wanted, they had to shift a part of the ship's paid cargo, which consisted largely of monster packing cases of tremendous weight.

Only because of the ship's weak artificial gravity were they able to move them at all, and even then their mass made it a tricky, dangerous business.

"Mining machinery," said Garth, reading the stenciled designation. "Funny they'd trust expensive stuff like that to this sort of ship."

Holt's smoldering eyes met his. "That ain't all that's funny about this ship," he answered darkly, and lapsed into his customary moody silence.

From Jonkin, Garth had learned that Holt had been an officer once, but in a blaze of temper had knocked down a rawhiding master—technically an act of mutiny which barred him from getting legitimate papers. His voucher, Garth imagined, had also been furnished by Dickby, Pedersen & Co.

The work went on until Holt, in a fit of moody abstraction, let his steel bar slip from under a case they were shifting. With a howl of warning he jumped back, and Garth escaped the tumbling juggernaut by a hair. The case teetered over, dropped with a screech of splintered wood across the corner of another, and crashed to the floor. Several boards had been stove in, exposing the contents to view.

Garth drew a dismayed breath as the droplight showed a long crack in the heavy metal casting inside, then scowled as the light revealed other cracks; rusty, broken edges. He tore more boards away and stood with Holt looking at the *Carlyle Castle's* cargo.

The "mining machinery" was scrap steel.

Holt drew a deep breath. "I told them," he said fiercely. "I told all of you—this is the trip."

"What do you mean?"

"What do you think?" sneered Holt. "A rusty tub leaves Venus with a cargo of expensive machinery on board. She's been tramping for a year, so she has no trouble getting insurance after proving there's a full crew on board. But the machinery is junk. There's no other cargo, and you can't make money by carrying scrap to Mercury."

"You mean—"

"I mean she's a death ship," snarled Holt. "A shipful of corpses—you, me, everybody but the officers. She isn't meant to get anywhere. She's due to be listed 'lost in space,' and the owners will collect for her and for a million credits' worth of mining machinery they never owned. Our lives? The hell with them. That's what I mean, Garth."

It was plausible, especially in view of the bogus cargo. But, Garth considered, this was Croaker Holt talking.

"I don't think Denham would be in on a thing like that," he objected.

"Maybe not Denham," Holt said, "but Dickby and Pedersen are. They'll jump ship in one of the tenders to save themselves. They can lie low on one of the asteroids and collect their cut later on. The rest of us won't be so lucky. We go with the ship."

Garth shook his head, unconvinced. They stowed the broken case behind some others, and Holt said no more, although his manner from then on was even grimmer than before. His story started whisperings among the crew, however, and Garth could sense a growing uneasiness aboard the ship. What if Holt were right? The officers, with law on their side, were masters of the situation. Upon them depended the safe navigation of the vessel. If they chose to hurl the *Carlyle Castle* into the Sun, not a soul on board would know until it was too late.

AND then, for two age-long watches during which he tossed feverishly in his bunk, Garth forgot about Holt's suspicions entirely. When he was again on his feet, Denham set him to polishing brass in the control turret, light work intended to let him regain his strength. Garth had never been in this part of the ship before, and the familiar although old-fashioned instruments awoke pangs of memory in him. Captain Dickby, intently at work with the calculator, paid him no attention. There was no sound in the room but the click of the machine and the dry whisper of the air circulators, for the rockets had long been shut off.

Garth had been at work about half an hour when Denham burst unceremoniously into the turret, his blond hair disheveled and his usually neat uniform spotted with grime. Garth looked up in astonishment, but the captain, absorbed in his calculations, was unaware of Denham's presence until the first mate stood before him. Dickby looked up then, and an unfathomable expression flashed over his face. With a quick sweep of one arm, he brushed aside the papers he had been working on.

"Mr. Denham!" he snarled. "What are you doing here? Isn't it your watch below?"

"It is, sir," Denham answered a bit breathlessly, "but I have a special report to make. It's urgent—"

"It's urgent, Mr. Denham, that my officers stick to their duties until relieved. What's this report?"

The first mate flushed, but answered promptly. "Life tender No. 2 is unfit for service, sir. It has been deliberately tampered with, gaskets damaged, valve threads hammered, and the rocket-control cables slashed."

"Very well, Mr. Denham," snapped Dickby. "I note your report. How did you learn of this?"

"It's the first officer's duty to inspect life tenders, sir. I've done so regularly, but never found anything to report before. That is why I know this is deliberate sabotage, and that it was done since we left Venus."

"I see. Very well, I'll confer on repairs with Mr. Pedersen when he comes on watch. Carry on, Mr. Denham."

But Denham stubbornly remained.

"Your pardon, sir. The work can't wait one watch. Repairs will take upwards of thirty hours. Should we miss Mercury, we'd have to take to the tenders not more than fifty hours from now—"

"I am well aware, Mr. Denham, of the dangers of a Mercury passage," rapped Dickby. "You may begin dismantling the valves, if that is necessary. Have you any idea who may be responsible for this?"

"None whatever."

"We'll talk about that later, then. Carry on."

DENHAM LEFT the turret. The captain, after a few scowling glances at Garth, also climbed down into the ship proper. His mind busy with what he had overheard, Garth worked automatically until he came to the calculator table. The papers were gone, but Dickby had forgotten to clear the machine. Beneath its windows appeared a course setting, the position of the ship from which it had been calculated, its speed, and a row of corrections.

Acting upon an unreasoned impulse, Garth turned to the observation scope and got a sight on Mercury. From its position and the figures on the calculator, he hastily worked out upon the chart pinned to the table the relative future positions

of ship and planet. So puzzling was the result that he hastily rechecked it without finding any error. By following the course given, the *Carlyle Castle* would intersect Mercury's orbit only after that tiny world had passed the point of intersection.

At the sound of footsteps on the metal deck below, he hastily stuffed the scribbled sheets of figures into his pocket, set the observation scope back in its former position, and busied himself with polishing its brass standard. A moment later Dickby climbed the turret ladder, still frowning, and sat down heavily before the calculator. There was a clicking rumble of gears as he cleared the machine, then only the fall of tumblers as he plunged into further calculations.

What he had just learned disturbed Garth far more than Holt's suspicions and the discovery of the *Carlyle Castle's* fraudulent cargo. Did the captain mean to miss Mercury and allow the ship to be caught in the immense gravitational trap of the Sun? If not, why was he plotting a course which would do just that? What did the sabotage of the life tender mean? And why had only one, and not both, been tampered with? Was it because Dickby and Pedersen planned to escape from the doom freighter in the other, as Holt had said?

Was this a death ship, meant to vanish for the profit of the owners? The bogus cargo was a point in Holt's favor. So were the general air of neglect about the ship and the fact that undesirable men were helped, even to the extent of being given fake vouchers, to obtain berths aboard her. Evidently Dickby wanted such men—men without papers, without recourse to spacemen's courts, without ties—men of the lost legions of space, whose disappearance would stir neither comment nor inquiry.

Death ships were legends in every port, and certainly behind some of the wild tales was a solid wall of facts. Probably many such vessels were never suspected, for they might cruise for years as legitimate tramps, only to vanish without leaving survivors—or, at any rate, no talkative ones. Even if the men on board grew suspicious, they were not the sort who could afford to jump ship in the hope of finding another berth. More likely they would remain, hoping always to escape the last fatal voyage somehow.

It might be, on the other hand, that the *Carlyle Castle* was merely engaged in some comparatively harmless smuggling for which the "mining machinery" was a blind. That would explain the choice of the men, some of whom were probably fugitives from the law already. As for Dickby's course reckoning, careful navigators sometimes worked out alternative courses as a check upon the one they adopted, and this might have been the captain's purpose in setting up the fatal calculation Garth had found upon the machine. But the sabotage of the life tender was not so easily explained, unless there were two distinct factions aboard. Did the *Carlyle Castle* carry a secret and valuable cargo which the officers meant to smuggle to Mercury, and which some unknown member or members of the crew planned to highjack? Such highjackers might have put the second tender out of commission to eliminate pursuit when making their escape in the other tender. The *Carlyle Castle* itself—underpowered as most freighters—could not possibly overtake the speedy smaller vessel.

It was a theory, at least—a possible alternative to Holt's explanation

—but Garth saw no way to prove or to disprove either of them. Whichever was true, most of the crew were mere pawns in a game whose existence they scarcely suspected.

FINISHED in the control turret, Garth went below to find his watch at work on the life tender. Valves were being removed and taken apart for rethreading in the machine shop. Denham was tracing the severed control cables on a greasy blueprint, and at once commandeered Garth's help. Dozens of fine wires, the vital nerves of the little ship's control system, had been slashed. The damage was thorough and could only have been meant to render the lifeship inoperable. Yet it could all have been done by one man—Pedersen, for instance—in fifteen or twenty minutes. Repairing it, Garth thought, would take rather more than the thirty hours Denham had estimated.

The watch over, Denham dismissed the men for mess and a few hours of sleep, himself remaining to turn the work over to Pedersen. Garth wondered, as he ate, whether the second mate were the saboteur. If so, he would probably make at least a pretense of carrying on the repairs as the obvious and easiest way to quiet suspicion. The men were aroused now, with no need of Holt's dark and fiery speeches to awaken them to their peril. If the *Carlyle Castle* overshot Mercury, as ships had before this, their lives might depend upon the tiny, high-powdered tenders, which could attain escape velocity even after the parent vessel was irrevocably trapped by the Sun's gravitational pull.

The talk continued even in the bunkroom. There Holt's remarks, bolstered by the mystery of the lifeship, wrought the crew to a pitch where a word from Garth of his observation in the control turret would have brought on open mutiny. Knowing that, he kept silent. Unfounded revolt could mean only disaster for every man on board. Time enough for that if the *Carlyle Castle* missed Mercury. He listened and said nothing.

Abruptly, like the flickering out of a lamp, voices ceased. Garth looked up. In the doorway was the evilly grinning face of Pedersen. His cold eyes swept them contemptuously for a full minute while the men stared back, cowed, uncertain. Deliberately he spat and turned on his heel, leaving silence behind him. Two men slowly pulled blankets back and rolled into their bunks. Others sheepishly climbed out of stained dungarees. Holt ripped out an oath.

"You yellow-bellied fools! That's what he came for. Are you going to be done in without a fight?"

They shrugged their shoulders. Uncertainty, and Pedersen's appearance at the psychological moment, had taken the fight out of them for the present. Holt lapsed into bitter silence, but instead of getting into his bunk, sat down at the tiny table, his head in his hands.

Habit, however, soon claimed the others. Snores presently announced their sleep, deep and genuine. Garth, at first wide awake, felt a sudden, overpowering drowsiness just before unconsciousness came. His last glimpse was of Holt, slumped down at the table and snoring lustily.

THERE WAS a sickly, sweetish taint in the atmosphere when Garth awoke—and the electric clock over the door declared that he had slept not five, but twelve, hours. He was on his feet in an instant, aware of a slight nausea, and it flashed through his mind that the air had been

drugged, probably by pouring a volatile anesthetic into the circulators.

"Holt!" he bellowed. "Jonkin! Kelders!"

The men called stirred uneasily, but only Holt sat up, blinking uncomprehendingly. Garth pointed to the clock.

"We've been drugged. Help me wake them."

Holt responded at once, and together they woke the others, who grumbled and cursed at being aroused. But the effect of the drug had worn off, and presently all were on their feet, astonished and uneasy to learn how long they had slept.

"It don't make sense, it don't," muttered little Jonkin. "Wot's the matter? Wot is it?"

"It's Pedersen," Holt grated. "It's the officers' dirty little gamble with your lives, you white-livered, gutless rats. *We've passed Mercury!*"

Men looked at one another, aghast at the truth of it. Had the ship's course been correct, they should be braking for a landing on Mercury at this moment. But the rockets were silent. They were speeding unchecked, on a course that could have only one destination.

"The Sun!" One man, white under the oily smudges on his face, uttered the thought of all.

"Come on," Garth said. "Find out where we stand—"

In a body they left the bunkroom, uneasy because there was only silence where there should have been the whir and hammer of the machine shop, the murmur of working men. Instead, only the ever-active air circulators hummed whisperingly.

They were passing the machine shop when a roar from Holt brought all to a stop. One of the lathes was running, shiny, new-cut brass revolving in its headstock. On the floor, almost hidden, slumped a man.

He was not alone. Crumpled beside the machines lay all fifteen of Pedersen's watch. In a few minutes they were awakened and telling their story. They had been sent aft by Pedersen to work on the damaged valves, and while working they had felt drowsiness come on. Most of them had sat down wherever they could for a few minutes of relaxation, as they thought. A few, fighting sleep, had sprawled their length when at last it overcame them. They refused at first to believe how long they had slept.

Thirty strong, they came to the midship bulkhead. Holt grasped the door handle, tugged, and with an oath, applied both hands. Others gripped it, many together, to no more purpose. The door held.

"It's dogged on the other side, of course," said Garth. "We're locked in."

"Now what?" snarled Holt.

"Jimmies," ordered Garth. "Prybars from the machine shop. And one man go to Deck 3 and try the door there."

They watched Jonkin, monkey-like, descend the ladder. Through the floor grilles they could see him climb down the next. He was back in less than a minute.

"Locked it is, and tighter'n this, if anything," he reported dolefully.

Meanwhile the steel prybars had been brought. Men wedged them into the thin, gasketed crack between door and bulkhead. Hopeless, Garth knew, unless some flawed piece of metal snapped under the strain.

But that strain was never applied. Before the sudden squeal of unoiled metal, the unmistakable *chock* of dogs thudding back, the bars were withdrawn. Thirty men waited in tense expectancy.

The door swung open—and a bul-

let thudded *plonk* into the steel bulkhead. Denham, coatless and with a crooked ribbon of dried blood down one cheek, stood swaying in the doorway. Garth sprang forward and steadied him while seeking the source of the shot. The corridor stretched dim and empty before him, but it could be only Pedersen or Dickby—everybody else was accounted for.

"Get them!" said Denham weakly. "Loading Tender 1. Hurry—couldn't stop them myself."

GARTH propped Denham against the wall and set off at a run through the corridor. Holt and Kelders were close to him, the others strung out behind, as they burst out of the passageway into the compartment giving upon the lifeship deck. A gun barked twice. Garth felt the whistling passage of a bullet. Beside him a man pitched forward without a sound.

But the momentum of their rush carried them forward—thirty men against two, steel bars against automatics. The odds, Garth realized, were still against them. Dickby stood by the port tube of Tender 1, his gun threatening. Pedersen was hauling a bulky, burlap-wrapped package aboard the lifeship—four similar ones lay on the floor just outside the tube.

"I've got ten explosive bullets in this clip," roared Dickby. "Any of you that want the guts blasted out of you come on!"

That stopped them. An explosive bullet is a messy way to die, and, too, it seemed infinitely closer than the death of the Sun, still hours away. Garth, who had even less to lose than the rest of them, suddenly decided it wasn't worth his while to wait. He snatched Holt's bar and flung it, all in one frenzied movement.

It struck Dickby on the knee, and the bullet meant for Garth exploded viciously against the ceiling grids. Other bars hurtled murderously across the deck. One spun end over end to hit Pedersen squarely across one temple. The second mate dropped the package he was carrying and slumped at Dickby's feet. The captain, roaring with the pain of his shattered knee, made grim use of his gun. Bullets bit into the mass of men behind Garth, and while they hesitated for a rush, Dickby hauled Pedersen into the port tube.

"They'll get away," Garth shouted. "Come on—"

He led the rush, snatched a prybar from the floor and thrust its wedgelike tip into the narrowing gap between door and frame.

Too late. Bolts snicked home. The steel panel settled inward that fraction of an inch that told of tightly drawn dogs. For twenty seconds there was a silence loud with the harsh breathing of baffled, beaten men. From beyond the curved wall of the tender well came loud clickings as magnetic grapples let go, then a muffled roar—and silence.

"Got away!" snarled Holt. "Dirty murderers—"

"Bear a hand with the wounded," said Garth. "Then we'll see what's what."

He was shocked to find that one of the six men on the floor was Denham, his shirt bloodsoaked at the armpit, where a bullet had burst without actually entering. Kelders and another man were dead. A fifth insanely waggled a handless wrist. One more was only touched, but the last was absurdly alive with a gaping wound in the chest.

"Get these men to bunks," he ordered. "Any of you know first aid?"

"Aye," growled Holt. "I do—not that it'll help them—or us, now."

NEVERTHELESS, Holt was competent, and after seeing that the others would be cared for, Garth hurried to Denham, who had been carried to his cabin. While he was dressing the wound, the first mate regained consciousness.

"Wasn't much good—out there," Denham murmured. "They made it?"

"Pedersen was hurt. Dickby pulled him along, though. You're mauled up yourself. Hurt?"

"Could be worse," Denham admitted.

"You've got a clip on the head, too."

"That must have happened just before the lights went out for me. I was waiting for Pedersen—and then woke up in my own bunk with a headache. Must have been drugged, because it was hours later. I went forward and caught them loading the tender. Couldn't do anything—guessed you'd be locked in. I headed aft. Dickby must have heard me. He followed. You know the rest."

Garth finished the bandaging. "We're not sure about the ship yet—except that we should have reached Mercury before this. I'm afraid you won't be able to get around. I'll take a check if you like."

Denham nodded. Garth left, went up into the control turret. The instruments were undamaged; everything was in flight order. He took bearings, checked them with a scope reading on Mercury, now dwindling far ahead of the *Carlyle Castle*, and rechecked, but he already knew what the result had to be. The ship was spiraling toward the Sun.

The truth must have been written large in his eyes, for Denham nodded, bleak-faced, at sight of him.

"You're sure?"

"Triangulation and scope reading check," Garth answered. "Sunward acceleration positive. Two hundred ten tons of fuel in the tanks—"

"For a mass of thirty thousand tons," finished Denham. "Twice that much couldn't give us escape velocity. Do the men know?"

"They've guessed."

"Have to keep morale up. Never know—an eleventh-hour miracle. If we don't let ourselves crack."

"Miracles such as we need," Garth said, "don't happen."

Denham leaned back wearily. "I'm weaker than I thought. Somebody has to take over—discipline—our only chance. You, Garth. You've been an officer."

"I was master," said Garth slowly, "of the *Stellar Queen*."

"I guessed . . . it was like that. You're acting captain. Everything . . . in your hands. Do what you can."

He closed his eyes and lay back exhausted. Garth left, went forward again to the second lifeship. The closest examination convinced him that the tender could not be made spaceworthy in the time left them. When he reached the control cubby he was sure of it. The switchboard had been wrecked.

OUT in the corridor, Garth laughed—laughed in a tone he wouldn't have recognized as his own six hours ago. Gale Garth, acting captain of the *Carlyle Castle!* By Heaven, he was a master again! And a ship was under him. *Captain* Garth! The moment he had dreamed of for two ghostly, hopeless years. Now it had come and it was a farce. Master? Aye, he was master. A ship? No, this was a coffin he commanded—a

coffin manned by walking corpses, and its destination death.

He laughed again, a hard, shivery laugh. And then he saw Jonkin standing at his elbow, an almost respectful Jonkin, with something in his hand.

"I been to see Mr. Denham, and he says you're captain now. I got somethin' maybe you ought to see. It come from those bags Pedersen was tryin' to haul aboard."

Jonkin thrust the thing into Garth's hands, which shook a little as he unwrapped the straw-and-paper packing, for it was all hellishly familiar. He would have recognized the shape of that bottle anywhere, unlabeled though it was.

"It's dewlog," he said harshly, his nerves suddenly raw. "The captain and Pedersen were running a bit of smuggling, after all, on the side. We nipped that, though." He fixed Jonkin with a furious eye, while his heart whipped wildly. "Dewlog, you understand? Lock it up. Let nobody touch it. Don't tell the others."

Jonkin bobbed his head and was off. But Garth stumbled to Dickby's cabin and sat down heavily, for every nerve in his body was a-tremble with desire. Dewlog! It was said you wanted it worse than ever the first six months you left it alone, and with him it had been only six weeks. His metabolism still wasn't quite normal; his system was starved for elements it couldn't as yet obtain from anything but dewlog. The drug would put new life in him, strength he hadn't had since leaving Venus. Of course, it meant losing all the ground he'd gained. If he went back to the stuff now he'd never be able

to quit it again. But that didn't matter now. Nothing he did or didn't do could change what was to be. He and everybody on board had just so many hours to live—a matter of precise calculation that no amount of discipline could alter by a hair. Firing the fuel that remained, making a show of handling the ship, could only postpone the end, not prevent it. The *Carlyle Castle* had her grim flight orders, and no man on board could countermand them—so many hours, so much of life remaining. But they had to live those hours, and if dewlog would help him to forget, where was the harm in that? Gale Garth was through, in any case.

A fire of anticipation ran through his veins as he stood up. He was almost sorry for the others, for the poor devils who weren't addicts, who hadn't the anodyne of the drug. He kicked the chair away behind him, and his eyes came level with a cross-sectional side-view drawing of the *Carlyle Castle* that hung over Dickby's desk. He looked at it indifferently, half drunkenly, swaying with the desire that blazed within him. Hell, a master ought to know what his ship looked like, shouldn't he? Well, now he knew. She was a tub, a damned old-fashioned turreted tub. And now that he knew, he was going to swill himself so full of dewlog he wouldn't be able to stand.

He turned toward the door, and then he turned back to the drawing. Something queer there had half registered on his fogged mind. Impatiently he glanced over the thing again, furious at his bootless curiosity. What the hell did it matter now? What difference could it make that the *Carlyle Castle* was old-fashioned, poorly designed according to modern standards? Control turret, fuel tanks and generators aft. Air circulators, life tender wells, and cargo forward. A tail-heavy tub when not loaded. So what?

And then he knew. It came in a full flash now, and his whipping heart settled to a hammering thump that he could feel in his temples. A moment's thought that had almost slipped past him in his insane desire for dewlog—and it held, perhaps, the life of every soul aboard the *Carlyle Castle!*

He copied weight-distribution figures from the drawing, raced to the control turret and plunged into calculations. Thirty-seven hours! If it could be done in that time there was a chance. A chance, with fate offering no odds—

He raced out of the turret, howling for Jonkin, and when that monkey-faced little spaceman appeared, seized his arm in a grip that made him wince.

"Quick!" snapped Garth. "How many space suits on board?"

"Eh? Three, maybe, and two of them not fit to leave ship in. I stowed that dewlog safe—"

"Never mind the dewlog. How about cutting and welding torches?"

"Ask Holt. 'E should know—handled it last, 'e did. But we got two, maybe three outfits. Plenty of gas, too."

"Assemble all hands in the main cabin. I'll be there in a few minutes. Hurry!"

JONKIN hurried off, and Garth hastily visited the fuel tanks, to take direct readings from the gauges there as a check upon the readings electrically recorded in the turret. There wasn't, as Denham had said, half enough fuel to attain escape velocity this close to the Sun. The *Carlyle Castle* was too big. Her mass trapped her. Dickby knew that, or he would have dumped the tanks.

Garth grinned with satisfaction. There was as much fuel as he had hoped for—and the tanks lay well aft. He climbed back to the main deck, and shortly afterward faced the assembled crew.

There was the sullenness of death about them. Discipline, he knew, hung by a thread. Hopeless, afraid, knowing themselves once betrayed, they were ugly in their very despair and as silent as trapped animals. But there was a collective snarl on their faces as they watched Garth.

Garth waited, outwardly calm, his face as impassive as he could make it. He waited, as though time were eternity, as though the *Carlyle Castle* were not rushing headlong to doom until the shuffling of feet ended, until he commanded the silence.

"There's just one reason I want to talk to you," he said slowly. "Everything Holt has been telling us is true. We're headed for the Sun. The life tender is a wreck. Dickby and Pedersen have done their best to see that none of us ever gets back to testify against them. But if you want to live badly enough to work for it, there's a fifty-fifty chance. It's all together—or none of us. What do you say?"

They said nothing at first. More suspicious than ever, already unaccustomed to thinking in terms of life, they remained mute. Then Holt's voice, harsh, incredulous, spoke for them all.

"Don't lie, Garth. There's no such chance—not even a thousand-to-one chance."

Garth answered calmly, unangered. "But I say that there is. It's not a sure thing. It's desperate and clumsy. It may fail. Maybe the odds aren't as good as I think. You may work like the devil and roast anyway for all the good it does. But if you're men, you'll want to play the chance—no matter what the odds may be."

"What's the scheme?" cried a voice.

"My secret," Garth answered coldly. "If you choose to die like trapped rats, that's your business—and you need no master. If you want to live you'll take my orders—it has to be done that way. Work together or not at all. We're shorthanded as it is. What do you say?"

"I say you'll tell us what's up," growled a red-haired giant, leaping forward. "We've got a right to know. Make him tell, mates!"

A roar of assent went up. The men moved forward in a solid mass, despite Holt's efforts to hold them back.

"Better talk, Garth!" he bellowed. "Talk fast."

The gigantic redhead sprang at Garth, fists swinging. A blow on the side of his neck sent lightning thrusts of pain into Garth's brain. He saw the fist swing again—and fury convulsed his muscles. His knuckles cracked on the giant's cheekbone. Stars exploded as something hit him solidly below one eye. Through a fog of pain he saw the redhead's jaw, swung madly, felt the impact of bone on bone. The man was down. Holt was roaring with the fury of a stricken bull, and laying about him with cold and telling precision. Even little Jonkin, squealing with excitement, ranged himself beside Garth, who was fighting now like an insensible automaton. Submerged in pain, Garth no longer felt each blow, but doggedly returned what he got with all the energy he could draw from his aching body—a nightmare of motion, blurred in agony that flickered again and again along dewlog-raw nerves.

Then there was a clear space before him, and Jonkin, bleeding from the mouth, and Holt, breathing in great gasps, standing before the other men. Their eyes were on Garth.

"Give your orders," said Holt. "We'll take them."

GARTH swayed, steadied himself against the wall. Couldn't let himself slip now—they were waiting. Waiting to work. Aye, and he was master!

"Holt, you're first mate. Take cutting torches and rip the inner plates off the forward hull. Patch leaks as you go. Send the plates back to me. Jonkin, you're second mate. Break out the space suits and patch them. Take two men. I want fourteen men myself. Get going."

They did, and within an hour, under Garth's critical eye, the various units were functioning satisfactorily. Within the ship's blunt bow, eight sweating, puzzled men were peeling inner hull plates off. Occasionally the hiss of air was heard, escaping through some opening in the scarred and dented outer hull. If large enough to be troublesome, the leak was sealed with sputtered-on, instantly solidified metal. The detached plates were carried aft by a second crew, while a third was carrying the useless lifeship's flasks of liquid oxygen into the *Carlyle Castle* and transferring the tender's fuel to the parent vessel's tanks—a small but possibly valuable addition to their reserve of power.

Garth meanwhile stalked from level to level, measuring and marking hull girders, cables, conduits and pipes on blueprints he had found in the control turret. Sleep was forgotten, food wolfed down with scarcely a pause. Just forward of the engine and generator room, three levels below the turret, men under Garth's direction cut apart wiring, pipes and floor gratings, insulating or sealing the severed ends where necessary.

Lights winked out here and there through the ship as connections were broken. Oily water sloshed about the generator pits. Jagged ends of girders and floor grids gleamed dull silver in the flicker of emergency lamps.

It was unnerving to see the sudden shadows loom and darkness fall in the long, echoing corridors of the old ship. Men looked askance at Garth's work, the more uneasily as lamp after lamp winked out forever. More than ever, the *Carlyle Castle* seemed a death ship, mutilated and darkened, eerie with impending doom. It was an impression not easily denied, and men who had first worked with willing good humor grew sullenly silent as the hours went by.

Garth felt their change of mood, but had neither time nor patience to deal with it. The first tangible intimation that something was wrong came to him with a realization of sudden stillness, a cessation of sound, a hushing of hammers and torch flames and saws. He straightened from the girder he had just marked and turned around. He was on Deck 2 then, and should have been alone, but at the head of the ladderway, all fourteen of his men were gathered, first among them the huge red-headed man Weldon, whom Garth had knocked out once before. But there was a difference now. Not anger, but a berserk fear, sat in Weldon's eyes—the eyes of a man convinced of death, and doubting all else. In the eyes of the others that same panic was mirrored. Garth stood up, rigidly alert.

"What are you doing here?" he demanded. "Get back to your work. Lively!"

"We're through workin'," bellowed Weldon. "Think we're fools? Think you can make us forget by rawhidin' us? You lied—there ain't a chance. Tricked us—and we're gettin' you for it."

He advanced, his mouth working, one fist clenching and unclenching spasmodically, the other white-knuckled with its grip on a steel bar. Garth stood his ground. To retreat would be to bring the pack down.

"Tricked us with lies! Made us sweat our guts out!" mouthed Weldon furiously. "But we're through now—"

The bar lifted—and Garth plunged forward, ramming into Weldon's body before he could reverse the motion of the heavy steel. The man went down, with Garth on top of him, but the ship's slight artificial gravity instantly nullified that advantage. Weldon heaved convulsively and they rolled over until Garth could feel the bars of the floor grid under his back. His left hand held down Weldon's wrist, and with it the murderous bar, although the other strained furiously to release it. Steel slithered against steel. The tip of the thing caught in the floor grating, and Garth exerted all his strength in twisting the hand that held it. With a howl of pain, Weldon let go. The bar teetered, slipped through the floor. Garth's eyes followed it as though fascinated. His straining body was suddenly rigid.

"God! The generator!"

Oath and prayer strangely commingled—and then disaster in a flash of hellish white and red, the blue glare of burning copper, a semi-explosion that ripped and echoed from level to level. Metal screeched as though in unendurable pain. Half the fluorescents winked out, and in the wan glow of those left, men looked at one another as though stunned.

Garth was on his feet, unhindered by Weldon and, plunging through

the compact mass of men, hurtled down the ladder to the engine switchboard. He cut the ignition on the auxiliary motor, and the shaft groaned to a stop.

"Electrician!" he called.

"Aye, sir." The man came forward docilely enough, shocked into obedience, but shook his head. "She's done for. Commutator's stripped."

"Spare?" Garth rapped out.

"Ain't none aboard, sir."

It was a stunning blow to Garth. This generator, delivering four thousand volts D. C., supplied the rocket igniters. Without it the blasts couldn't be lit off.

"How about rectifying the A. C. output?"

The other grunted negatively. "No rectifying equipment aboard that could handle that much current."

Garth swore. "We've got to have this generator. Repair it somehow —if it runs ten minutes, it'll do. The rest of you get back to work."

SHEEPISHLY, the ex-mutineers obeyed to a man. Either the accident had shocked them back to sanity, or Garth's concern about the ruined generator convinced them more than words that he actually had a plan for their salvation. The work went on. Squarely across the *Carlyle Castle*, supplementing the bulkhead just forward of the control turret and generator room, grew a wall of tough alloy steel. Made of the hull plates Holt's men had stripped off forward and welded together into an air-tight whole, it cut the ship into two parts—the aft section only about one third of the vessel's total length. To the rear it was securely braced by a network of steel welded to hull—hull girders and transverse beams.

Thirty of the precious hours were gone when that much was done. Holt's men, as well as Garth's, gathered before the wall, sweat-stained and weary.

"Three suits ready," reported Jonkin proudly. "Not like new, but they'll hold up."

"We'll need them soon," said Garth, "because we're going to cut the hull through right here. Cut the ship in two. One part is dead weight —cargo, lifeship, and air circulators —which we can do without. The smaller part has the turret, fuel tanks, and rocket motors. That's ours. The *Carlyle Castle*, thirty thousand tons, couldn't be budged from the course Dickby gave her. But our part of her won't be more than nine thousand mass tons. We've fuel enough and tubes enough to accelerate nine thousand mass tons to escape velocity. We'll be crippled by lack of bow steering jets, but once we're free of the Sun we can rig a heliograph to reach Mercury or Earth and get a rescue ship sent out after us. Meanwhile we'll have plenty of liquid oxygen, stores and water."

A ragged cheer went up as, with the vision of life before them, men went back to work. The last girders marked by Garth were cut in planned succession, the few remaining conduits and cables cut and sealed. With that the ship's artificial gravity vanished. Hand lines were rigged spider-web fashion, and men walked with mincing steps to avoid being flung from their footholds.

The inner plates of the double-walled hull, just forward of the newly erected bulkhead, were burned through with the torches in a straight line about the ship's circumference. Air was escaping from a

dozen fissures when Garth ordered all hands aft. They filed through the little steel box that had been welded over the bulkhead door to form an air lock. Garth, Holt and a third man remained outside, donned space suits, and with the torches attacked the outer hull through the slit already opened. Hissing flames cut a slender black line through which air roared free into space. Smoking arcs curved around and met. The two parts of the severed ship, with a gap between them that was black as space on one side, white with the glory of the Sun on the other, still sped together as one, although the pressure of escaping air had driven them a little farther apart.

Tapping the other men on the shoulders, Garth motioned them to the air lock, while he made a last inspection of the work. The remnant of the *Carlyle Castle* that now harbored life looked as though lopped off by a gigantic sheers. An ungainly stump, its severed arteries sealed shut, it looked anything but navigable. Yet its shape was of no importance here in the vacuum of space. Streamlining was indispensable only in ships meant to take off and land on atmosphere-clad planets.

GARTH was last to enter what was now the ship. Holt's men were sealing a few leaky seams in the bulkhead which it had been impossible to detect before. Everything now hinged upon the four-thousand-volt D. C. generator. Without its current to heat the igniters to the six-thousand-degree temperature necessary to light off, all the work done was valueless. The generator, Garth

told himself, *had* to be in working order.

Nevertheless, his heart sank when he saw the electrician's work. Probably the man had done his best with the stuff available—tramp ships carried a minimum of spare parts—but it would be a miracle if the thing delivered current at all. The copper bars, deeply pitted and scored despite a surface burnishing, were held fast at their outer ends by a turned ring of pressed fiber, split and held together by an improvised clamp.

He found Denham awake and stronger, and explained to him what had been done. "If you can handle the turret," Garth said, "I'd like to stand by below and see how that generator takes speed. If it doesn't, a quick shutdown may give us a second try later."

Denham immediately agreed, the prospect of action bringing color back to his pale face. With his wounded arm bound close to his side, he climbed with Garth into the turret. It was hot here, despite the heat-absorption plates over the ports, and through the single uncovered one sunlight poured a blazing torrent. Ahead, apparently motionless, stretched the gray, battered hulk that had been cut free.

"Fifty seconds side jets ought to pull us over," said Garth. "Cut in your stern tubes as soon as you're clear, because there's no telling how long that generator will last."

Denham took his place at the controls, while Garth again went below. At a signal from the turret telegraph the electrician started the auxiliary motor. Slowly the generator shaft with its patched commutator whined up the scale of speed. Relays cut in loudly. Brushes shrieked against the scoured copper segments. But the extinguished fluorescents flickered into life, only to wink out at a word from Garth, who wished to save ev-

ery ampere of output for the all-important igniters.

"It's holding, by glory!" bellowed Holt, and Garth pressed the turret telegraph lever to notify Denham that he might light off.

The motion was never finished. Without warning, there came a snarl of ripping insulation. Blue-white fire flashed. Something hit the ceiling grid with terrific force. A brush holder broke with a crash. Smoke gushed as Garth tore open the ignition switch. For the second time the generator grated to a stop. The commutator was a smoking ruin, blackened to the core, some of its bars flung out bodily by centrifugal force.

"Pluto's moons!" gasped the electrician. "It took the windings that time."

It was true. The armature windings were a black, sticky mess, short-circuited and burned out by the faulty commutator.

"Rewind it," snapped Garth.

The man shrugged. "Seven or eight hours, at least, if we have enough wire aboard."

SEVEN hours! Garth felt his strength sag under that ultimatum. In less than two hours it would be too late. They would be too close to the Sun to attain escape velocity, their mass of fuel reserve considered. Already, despite the refrigeration equipment still operating in this part of the ship, the temperature stood at a point only too eloquent of their close approach. All of them had long since stripped to the waist.

Denham was painfully descending the steel-runged ladder, probably apprised by the noise that something had gone wrong. He made no comment at sight of the ruined machine.

"How about using the lifeship generator?" asked Garth.

"Too small," Denham replied. "The tender uses the new Starr ignition system, with built-in igniters that take only a tenth the juice the old ones do."

"So that's out," said Garth bitterly. To have come this far—and fail! For they had failed. It only remained to tell them so. False hope could be crueler than the truth. "That's that, then. We can't light off. There's nothing else to be done."

They didn't understand at once. Their eyes mirrored a dull refusal of belief, like those of children faced with tragedy. But as understanding dawned despite themselves, men turned soberly away.

"Can't light off?" asked Holt. "Give me a suit and a torch. I'll light off—from outside."

Garth shook his head. "Torch isn't hot enough. The fuel kindles at six thousand degrees. Under that, atomic combustion won't start. Sorry, Holt—"

It was ghastly irony to come so close as this, only to give up. Irony, too, that they had plenty of current—of the wrong kind. If only the igniters could be made to operate on alternating current. But that was impossible. Not only was the voltage too high, but even if they carried the overload momentarily, self-induction would fuse the firing coils instantly.

Would fuse them instantly!

Garth seized the electrician in a grip that made the man's jaw drop open with pain and astonishment. "The A. C. overload relays—what do they break at?"

"Twelve hundred amps, as they're set now," the man answered. "But you can't use A. C. on the igniters!"

"We're going to," Garth snapped. "Set the breakers at fifteen hundred amps—the highest you can without endangering the generator. We'll

ruin the igniters—but we'll light off doing it. Cut the A. C. over to the igniter circuit and stand by those relays. Each time I signal after they break, close them."

"Aye, sir," gasped the electrician, and set to work.

While the change-over was being made, Denham took Garth aside. "You realize this mayn't work, Garth?" the first officer asked worriedly. "The igniters may fuse back of the coils. It's burning our bridges, although I don't say you shouldn't try."

"You may be right," Garth admitted. "In fact, I expect some of them to fuse back of the coils, but if only one in each bank of tubes does light off, we can get the other tubes lit from that one. With D. C., of course, the cables would melt before the igniters themselves, but with A. C. we'll have self-induction built up in the firing coils themselves—a local current of tremendous amperage. I'm banking on that."

"And I'm with you," Denham said, closing the subject.

With Garth, Denham watched the men complete the connections, then preceded him into the control turret. After seeing to it that the first officer was securely strapped into his acceleration chair, and fastening himself similarly before the dual control, Garth set the telegraph lever to "Stand by" position.

"Here's to luck!" said Denham softly.

Garth nodded. At a touch of his hand the acceleration alarm sounded its warning below. He inched forward the stubby lever that fed gas to one of the six port steering jets, set the telegraph lever to "Stand by for firing," and pressed the ignitor switch.

From three levels below came the crash of opening overload relays. Nothing else. No roar of blazing gases or flash of the red lamp before him that would indicate the tube had lit off. He pushed the fuel-feed lever shut, signaled the engine room to close the circuit breakers, and upon its acknowledgement fed fuel to the second of the port tubes.

The igniter switch went down. Again circuit breakers crashed open. Nothing else broke the silence of the doomed ship.

Denham's lips were compressed to a knife line, but his eyes spoke the significance of the moment. Two of the six jets had failed to light off. Had those two igniters failed prematurely, in some weak spot back of the ignition coils, and therefore were unexposed to the combustible gases? Or would they all fail in the same way?

Signal and acknowledgment from below. The third fuel lever forward, further this time. A wait until Garth was sure the tube was well primed. His thumb pressed the igniter button.

A shudder of exploding gases racked the crippled ship, settling at once to the muted roar of a single rocket tube in action. Denham's frozen lips broke into a triumphant grin as Garth fed fuel to the tube nearest the one firing. It caught explosively from the flame of the first, and the roar of power was doubled. Through the turret port the amputated hulk ahead could be seen shifting slowly to port. Breathlessly, Garth watched it. If a single overlooked projection caught and locked the two parts together, delay—perhaps disaster—was inevitable.

Then, abruptly, the danger was past as edge cleared edge with a scant foot to spare. Garth kept the side jets firing until the dead hulk was several hundred feet abeam,

then cut the tubes to an idling blast.

Again the telegraph clicked signal and acknowledgment. He opened the fuel feed of the first stern jet, but the relays crashed open without effect. The second and third tubes failed also. But the fourth caught furiously, and from its flame he was able to light off the entire bank. Acceleration crushed him and Denham back into their seats. Six of the last bank failed before the seventh caught, but with that all went into action. The crippled fragment of the *Carlyle Castle* underwent such acceleration as the old ship could never have experienced.

Garth let his heavy arms drop to his sides. His body was already aching under the punishment of acceleration, which must continue as long as their fuel held out, until the ship, cometlike, attained escape velocity. Denham, studying the acceleration meter, nodded reassuringly. There was nothing more that could be done, and now, for the first time during the driving exertion of the past thirty-eight hours, Garth knew himself to be near collapse.

SLEEP should have been impossible under the acceleration they were undergoing, but when Garth was again conscious he knew that he had fallen asleep where he sat. Denham was smiling quizzically. The rockets were silent, the mad surge of acceleration gone. But it was still hot in the turret, the sunlight as fierce as before. Had the tubes failed, Garth wondered?

"We're rounding the Sun," said Denham. "Speed's a bit over a hundred miles per second, which gives us a very fair margin above escape velocity. Fuel's gone now, but I caught a helio from Mercury—they put one of the new electronic detectors on us when we missed connection. A patrol flier will be on hand to pick us up in about ninety hours. The crew,

incidentally, have asked me to convey their respects—and thanks."

There was a sound from the turret ladderway, and the wizened little face of Jonkin appeared on deck. He saluted Garth smartly.

"Yuhr pardon, sir, but it's about that there dewlog I've stored in the brig. It's safe there, but things was happening so fast I forgot to give yuh the key."

He held out the bit of metal, and, as though it were a symbol of his desire, Garth felt the stark, familiar longing flush his veins. Nerves sharpened by dewlog clamored for that surcease from pain and tension that only the drug could give. He could have it—for the taking of a key. Denham wouldn't stop him.

Garth licked his hot lips, glanced at the first officer, who stood quietly by, making no sign. And then Garth heard his own voice, harsh with the rawness of his nerves.

"The dewlog will be offered as additional evidence against the captain and second mate. Mr. Denham will take the key."

Strangely, his own words gave him strength. They were like cool water thrown upon the fire of his desire. In that moment he knew that he had won for himself more than mere existence. His body still craved dewlog—would crave it for months still. But something in himself, something submerged and beaten since the evil adventure of the *Stellar Queen,* had been revived. He knew that he would never again touch the stuff; knew that, for the first time in two years, he was on the way back to the life he loved.

Denham pocketed the key as Jonkin vanished down the ladderway. The two men in the turret looked at each other. Then Denham thrust forth his hand.

"Congratulations!" he said softly, "*Captain* Garth."

THE END.

BRASS TACKS

Did the explanation satisfy?

Dear Mr. Campbell:

Like the Yin and Yang of Chinese philosophy—a combination of complementary forces that forms a perfect whole, like bread and butter—Astounding and *Unknown* balance each other completely. When the science of Astounding becomes boring, the fantasy of *Unknown* refreshes. And vice versa.

But now to the October Astounding: Being one of those rare people that read each installment of a serial as it appears, I found the second part of "Slan" even more interesting than the first. But van Vogt had better make his explanation of the tendrilless slans good! The surprise ending of "Farewell To The Master" made it a close second, with "Butyl and the Breather" third. This latter was an excellent sequel to "The Ether Breathers." The article by Ley is, in my opinion, the best this year with the exception of "The Science Of Withering."

Brass Tacks is bigger and better than ever. G. R. Wall says he would like to see Astounding with the same type cover as *Unknown*. That cover is best on *Unknown*, because fantasy paintings, no matter how well drawn, may give the impression of a horror mag. Astounding, on the other hand, looks much more distinguished with a beautiful four-tone painting.—**Bill Stoy, 140-92 Burden Crescent, Jamaica, N. Y.**

And "Slan" gets better as it goes!

Dear Mr. Campbell:

How could you? Why did you do it? Why did such a thing happen to me? I refer to your new serial effort, "Slan."

Here I was up in arms agin' the supermen, after a thorough dose of "But Without Horns" in *Unknown*. Wouldn't it be terrible for a Thing like John Miller to move in on the human race, et cetera, et cetera, et cetera? So I was an Anti-Evolutionist.

Then along comes "Slan"—in which it's the supermen that are in a pickle. Now I'm so far gone as to be preaching *against* Homo Sap! Yet I still think A. E. van Vogt and Norvell W. Page are **BOTH** examples of the best in science-fiction writing today.

Anyway, the conclusion right now is that "Slan" is a great yarn.—**Paul Carter, 156 S. University St., Blackfoot, Idaho.**

The navy's still doing all right, thanks!

Dear Mr. Campbell:

Before the start of this salvo, let me state I have never written to any magazine in all the years I have been reading science-fiction, but when the army takes a slap at the navy—stand by for a broadside!

Let me explain to Corporal Meyer that it is quite understandable why the army

doesn't write science-fiction. It has long been known that the army's brains are in its feet—at least to the navy—and it takes brains located in the proper storage vault to write science-fiction and sell it to Astounding! So enough for that.

I have been reading Astounding and *Unknown* since the first copy of each hit the newsstands, and find them well worth the forty cents per month they cost me. As for the stories, some are good, some are bad, and a few are super. In the latter class goes "Final Blackout" and the "Gray Lensman." Some day they will rate as classics, alongside such stories as Merritt's "The Moon Pool" and "The Blind Spot," by Hall and Flint. Congratulations to L. Ron Hubbard and Dr. Smith.

Hoping this letter will find Astounding getting bigger and better, and Corporal Meyer doing K. P.—Mrs. J. A. Thomas, 1350 Hellman Street, Long Beach, Calif.

Ralph Williams is working on another, longer yarn.

Dear Mr. Campbell:

I've been reading all sorts of science-fiction mags for about two years, but Astounding still rates tops on my list. I have been unfortunate enough to be out of work at present, so I have had to rely on one s.f. mag a month—Astounding, of course—and I'll keep on getting my copy every month if I have to steal, beg or borrow it! Your Nova serial "Slan" has turned out even better than it sounds. I always wait until I have all the installments before I read serials, but I just couldn't wait so long to read "Slan," so now I can hardly wait until next month to read the next installment.

By the way, I am not Ralph Williams, the author; but I was rather surprised to see my name at the head of a story. I would like to meet him sometime. His story "Emergency Landing" was pretty good.—Ralph Williams, 107 Wayne Street, Valparaiso, Indiana.

But doesn't Cartier's style fit some Astounding yarns?

Dear Mr. Campbell:

Your ballyhoo and promotion for "Slan!" —I still like the exclamation point—is one hundred percent justified. "Slan!" sets van Vogt on a par with Weinbaum, Smith & Co. I am saying this although I have only read three parts—I am not one of these strong-minded souls who take serials in one dose—and I also say that "Slan!" really rates the "Super-Nova" designation.

I very nearly wound up in the Territorial Hospital for the Insane last Friday. I purchased *Unknown*, with "Typewriter in the Sky" and "Darker Than You Think" and Astounding with "Slan!" and "Salvage" on that date, and had one hell of a time trying to decide what to start off with. I finally wound up with a decision favoring the "save-the-best-for-the-last" policy, and cracked the short shorts first, then went into "Salvage," "Typewriter in the Sky," a bit of "Darker Than You Think"—I am saving this for a Sunday morning, as I don't think it would promote sleep—and last but not least "Slan!".

I should heap a few curses upon your already well-condemned soul for not including Kathleen Layton in your cover for "Slan!". Now, dammit, I'll never know what she really looked like.

Why in the name of Klono's burnished beard d'you have Cartier in Astounding? He should be in *Unknown* and no place else but.

Was it psychology or a typographical error that left off the period in the last sentence of the third installment of you-know-what?

Story ratings for the November issue: "Slan," "Salvage," "The Exalted," "The Search for Zero," "One Was Stubborn," "Sunspot Purge."—C. J. "Mike" Fern, Jr., Atherton House, University of Hawaii, Honolulu, Hawaii.

Sometimes a story is the better for leaving something for the reader to think on.

Dear Sir:

This is a new experience to me. Although I regularly read Brass Tacks I have never felt the urge before to participate in its discussions. But now, since reading Harry Bates' "Farewell to the Master" for the second time, I feel I must tell you how much I enjoyed it.

It was really different. It has a poignant something about it that I never have experienced in any other story. The idea of a huge robot having a superscientific mind and utilizing it for good and to create beautiful creatures, such at Klaatu, instead of engines of destruction aimed at interplanetary conquest is most refreshing. It is not all cluttered up with the explanation of intricate machinery as most stories are.

I like a little of that if a story is based on fact, but when it is a flight of the wild-

est imagination wherein such apparatus could not possibly exist, then I object to so much description of alloys and instruments whose very names are senseless. Maybe I feel this way because I am a female and perhaps not such an avid student of pure science. I read science-fiction because it is so different. It stimulates the imagination and because I firmly believe nothing to be impossible to science today and years to come.

Getting back to Mr. Bates' story, it just screams for a sequel. In fact, if one isn't forthcoming I will feel an awful empty place inside me where Klaatu entered for so short a time and then left so suddenly and tragically. It was a definite shock to find he was not the master and this fact coming at the end of the story as it did in itself demands a sequel to tell us all about these two strangers, and, please, Mr. Bates, Gnute isn't a robot at all, is he?—Arline E. Doane, 47 Common Street, Providence, R. I.

SCIENCE DISCUSSIONS

For square root signs you get a special typewriter—for the calculus of statement, try Mace's "Principles of Logic." Ley referred to the "Handbook of Chemistry and Physics."

Dear Mr. Campbell:

Mr. Zollinger seems a bit confused. Perhaps this will help. I'm a junior in high school; you experts please excuse this. First, a theory must fit the facts, but facts, not necessarily any theory. According to the

infinite series referred to, the distance between the block and table converges upon, but never reaches—by definition—the limit zero as the number of terms is increased without limit. The series is .5—.25—.125 . . . and whose "sum to infinity" is .5/(1—.5) or 1.

But, the block *does* touch the table, so the theory is off. However we have $t\ d/r$, or, for accelerated motion, t equals the square root of $2d/a$. How are square root signs made on a typewriter? This brings up the "Achilles," Mr. Zollinger. Go to your local library, ask for Zeno's "Achilles" (or his "Paradoxes on Motion"), take elementary algebra to it, and "stump the experts" you argue with.

Mr. Campbell, when you O. K. science articles, please insist on a bibliography for it, preferably graduated from easy to hard, so that anyone can get more information. And could you give references for this "algebra of analysis" mentioned in several stories and articles? And, by the way, what's this book Ley mentions in the October issue, p. 122, para. 1?

Astounding ought to have a balanced contents each issue. A serial, novel, shorts, articles, et cetera. In general it now does. When articles were just coming in, they were popular for this reason. But please have science-fiction on the whole, although some variety is desirable.

I've read Astounding Science-Fiction since August 1937, an issue before "Galactic Patrol," and have kept all my copies. I've tried to get back issues at secondhand book stores, but I just can't get January 1935, which has Part 6 of the "Skylark of Valeon" —the climax of the story. Can anyone help me?—Joseph C. Ryus, 4355 Altadena Avenue, San Diego, California.

Psychology isn't an exact science—but it can be.

Dear Mr. Campbell:

Mr. Lynn Bridges' remarks concerning psychology in the Science Discussions November issue of Astounding really calls for some sort of answer, for I believe he is wrong not so much in his facts as in his viewpoint.

You see, when a person says that a problem's "very nature" renders it insoluble, he is sticking his neck out so far that it would be a crime to refrain from chopping it off. First of all, the philosophy of Experimental Science denies the existence of an insoluble problem per se. A problem may be insoluble because of certain missing links in our knowledge. It may be insolu-

ble because of certain physical shortcomings of either our sense or our mechanical tools. But it is never insoluble because of its own nature.

It is true that recent studies of the electron show the laws of ordinary mechanics to break down in their case, so that it is impossible to determine as a certainty both the position and velocity of an electron—and in that case, quantum mechanics was invented which solved the problem nicely, not as a certainty, but as a probability. And that is just as valid a solution. In fact, if we could invent tools capable of handling a single electron—which we can't so far—we might reduce the electron to certainty as well.

To be more specific, psychology seems to occupy the same place in Mr. Bridges' mind, that organic chemistry did in the mind of the chemist of the early nineteenth century.

Then, organic chemistry was considered to be a special province of the science, distinct in its very nature from ordinary prosaic inorganic chemistry. Organic compounds could be created only by living tissue, and required a vital force out of reach of ordinary man.

That conception was blasted pretty thoroughly. There is today no dividing line at all between organic and inorganic chemistry. There is not a single chemical process or a single chemical law which is unique to either organic or inorganic chemistry. It is true that organic chemistry as a rule is more complicated than inorganic, but that is only because the chemicals themselves are, as a rule, more complicated. It is true that organic chemists cannot control their reactions as well as inorganic chemists can control theirs—as I found out in every organic lab through which I ever suffered—but that is only because, in general, organic reactions are a trifle more complicated.

The big point is that in all cases the difference is only one of degree. It is as easy, theoretically, to synthesize protoplasm as it is to produce oxygen—because there is no chemical principle involved in the one that is not involved in the other—but the practical difficulties are greater in the first case, and more time need be taken to solve them.

In fact, so nonexistent is the boundary line between organic and inorganic today that the only definition of organic chemistry that will hold water is: "Organic chemistry is the chemistry of the carbon compounds." The only reason that can be given for picking carbon compounds rather than thallium compounds or germanium compounds for special study is not because of the connection of carbon compounds with life—organic chemists prefer not to mix the two if they can help it—but simply because there are so many carbon compounds.

The analogy is plain. Substitute for inorganic chemistry and organic chemistry, the sciences of chemistry and psychology.

Take digestion; it is a simple chemical affair. Food is a mess of chemicals; enzymes are a bunch of proteins; the intestinal tract is a mere semipermeable membrane ruled by definite physico-chemical laws. There is nothing mysterious about it. It is not as easy as A B C and probably never will be, but some day, supposing science to advance steadily it will be at least as easy as L M N.

Now then, why should the processes of thought and the nervous system be any more mysterious? The chemicals involved are more complicated. The reactions are more intricate. Electrical currents are mixed up in it. But there isn't a single new principle involved. It is the same old stuff a little further messed-up.

Mr. Bridge says "A stimuli applied to a grasshopper may always bring forth the same reaction, but men vary." I beg your pardon, Mr. Bridges, but men don't vary—not if it's the same stimulus under the same conditions. Your point is that men are so complicated that the same stimulus can never be applied under exactly the same conditions. Granted! It remains for psychology to incorporate into the eventual strict laws of mathematical physics and chemistry that will be developed the effect of any possible change of conditions upon any given stimulus.

And progress won't stop under those conditions. Mathematical psychology may show just exactly why Einstein is Einstein—but he'll still be Einstein in spite of that. If you want an analogy—chemistry shows *why* hydrogen will burn in oxygen and in chlorine but *not* in argon, and in spite of that hydrogen continues to burn in oxygen and chlorine and not in argon. In fact, if we can understand Einstein and Hitler down to the mathematical whys and wherefores, we might try to boost along a few Einsteins and cut down on a few Hitlers, and progress might really get going.

Please respond, Mr. Bridges, if you're not convinced. Even Tan Porus may be wrong—outside of "Homo Sol" where, as hero, he is always right.—Isaac Asimov, 174 Windsor Place, Brooklyn, New York.

DEAD—AND EMBALMED!

THE mystery of Venus' clouds may have been solved—in a way not particularly pleasing to the science-fictionist, at any rate. It begins to appear that Venus, far from being a tropical-jungle planet, is definitely dead—deader than Mars or even the Moon. Venus, in fact, may be a neatly embalmed corpse, preserved in formaldehyde!

Spectroscopic work has proven these facts, to date: there's a perfectly enormous quantity of carbon dioxide in Venus' atmosphere. If all Earth's air were compressed to sea-level density instead of diminishing in density with increase in altitude, the atmosphere would be about five and one half miles deep instead of six hundred miles. The cloud layers on Venus are far above the surface of the planet, certainly, so that what we can see of the atmosphere is not the densest part. But the spectroscope shows that there is so much carbon dioxide in the visible part that it alone would make a layer of atmosphere two miles deep under the conditions that would reduce Earth's whole atmosphere to five and one half miles. That's a rather overwhelming amount of carbon dioxide.

Detecting such immense quantities of carbon dioxide isn't very difficult—the greatest one encountered was in getting a thick-enough layer of carbon dioxide gas here on Earth to check the identification. A tube forty meters long with carbon dioxide at forty times atmospheric pressure had to be constructed before spectrum lines of equal strength could be secured for final proof.

The trouble came in spectrum analysis for water vapor and oxygen. It's simple enough to prove there's iron in the Sun's chromosphere. Take a solar spectrum, and there are the lines characteristic of iron—iron vapor in fact. We know with complete assurance that there is no boiling-hot iron in Earth's atmosphere, so the iron vapor must be in the Sun.

But take a spectrum of Venus, and there are, naturally, wide, strong lines of oxygen and water vapor. All home-grown or not, though? Certainly some are—Earth's own atmosphere, through which that light naturally had to travel, impressed its spectrum on it. The trick is to find some way of proving how much, if any, of the impression was made by Venusian oxygen and water.

It can be done in two ways. The Moon has no atmosphere, we know. Therefore, the spectrum of light reflected by the Moon will show Earth's oxygen, and that only. Comparing that result with the spectrum of Venus would bring out any differences. None have been detected.

Secondly, at certain times of the year, Earth and Venus are moving relative to each other in the line of sight at many miles a second. The Doppler shift of the spectrum will then shift any spectrum lines originating in Venus to one side of those originating on Earth, and make them separately visible. None have been detected. Our tests are sensitive enough to detect 1/1000th of the amount present in Earth's atmosphere—which means that there is practically no oxygen, certainly, and no tropical humidity in evidence.

Assume, as is reasonable, that when Venus cooled from the incandescence of its birth, it lost most of its hydrogen before it had cooled to

a point where compounds could form. Further cooling would see the formation of liquid magma, then a crust of rocks, finally the beginnings of seas. Oxygen is the second most active element existent; only the rare and virulently corrosive fluorine can displace it from its compounds readily. No inorganic process of planetary formation could keep oxygen free in the atmosphere; in the original formation of planets it goes down in metal oxides, rock oxides, and remains as gaseous carbon and hydrogen oxides. A newly cooled planet of Venus' size would, then, have small seas and lakes, and an atmosphere of helium, neon and similar inert gases, carbon dioxide and water vapor. Nitrogen might or might not be present; at high temperatures metal nitrides form quite readily and can lock away a world's nitrogen.

Now plants, by means of chlorophyl catalyst, can rapidly convert carbon dioxide and water to carbon organic compounds and free oxygen. Ultraviolet light can do the same, but much more slowly, forming, as the plant is suspected of forming, formaldehyde—practically nothing but a carbon atom stuck in the middle of a water molecule: H_2CO.

The reaction of water plus carbon dioxide to formaldehyde plus oxygen is easily reversible. But the reaction of oxygen plus rock to oxidized rocks is not reversible; in the presence of the surface crust, the oxygen produced by the reversible reaction would be extracted slowly and steadily as it was formed, and with the oxygen missing, the reaction becomes irreversible.

Also, while formaldehyde itself is a gas, it very rapidly and readily forms a more complex polymer, polyoxymethylene, that is a white, powdery substance—and that doesn't react as readily in the reverse direction as formaldehyde.

Given a planet near the Sun,

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where ultraviolet light is intense, with a comparatively small quantity of water and lots of carbon dioxide, the reaction would go to completion in a few hundred millions of years. All the water would be used up, all the oxygen locked away in rocks. The result would be an atmosphere of left-over carbon dioxide, inert gases, and white clouds of polyoxymethelene dust. And, of course, a dry, dead, and embalmed planetary corpse. And a very hot one, too—for carbon dioxide passes sunlight's short-wave energy inward readily, but blocks the escape of the longer wave length energy radiated by heated rock.

It's a fairly complete possible explanation of Venus' mysterious clouds that show no perceptible water-vapor lines in the spectroscope. It is not, however, either final or proven. It is still possible that the explanation is simply that the clouds are at a level of about ten miles from the surface, while the water vapor rises no higher than about eleven miles. This condition is actually experienced on Earth; it might be that astronomers on Mars studying the reflections from a cloud blanket over a large area of Earth would find very little water vapor present in the part of the atmosphere visible above the clouds. Above ten or eleven miles, Earth's atmosphere is thin and cold, so thin and so cold that nearly all the water vapor is frozen out. But Earth's water is protected from the formaldehyde reaction by Earth's oxygen. Earth has an ultraviolet-proof blanket of ozone formed from that oxygen; Venus hasn't.

Under any circumstances, it is definitely, conclusively, and completely shown that there is no tropical jungle growth on Venus. No planet with that much carbon dioxide in its atmosphere can have any extensive plant growth.

ARTHUR MCCANN.

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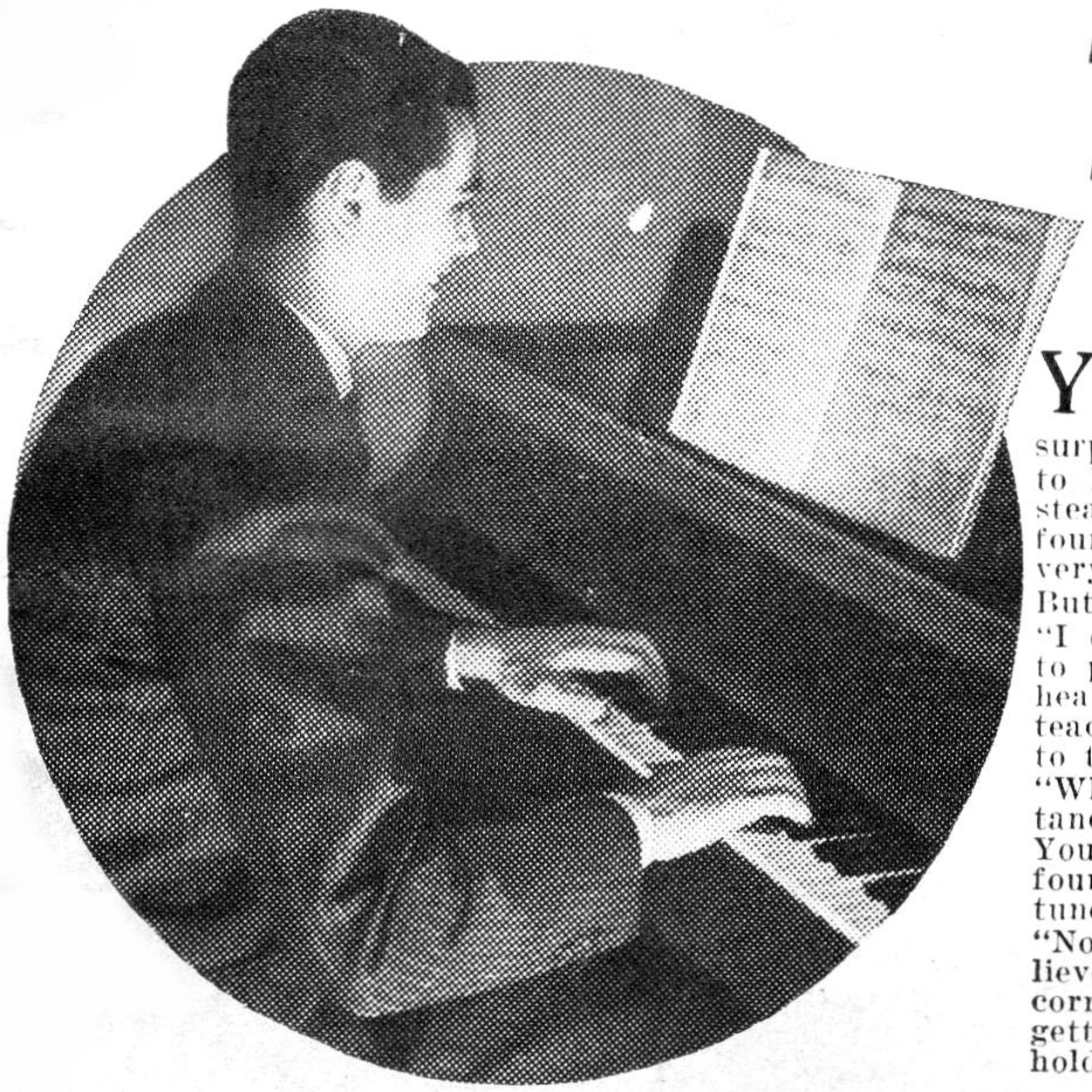

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