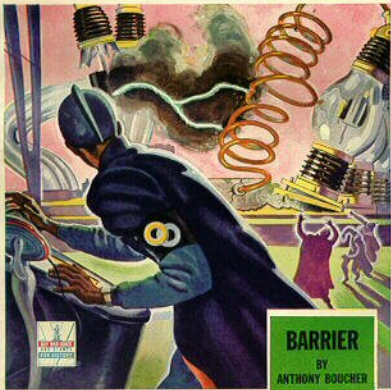


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SEPTEMBER
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Contents for September, 1942, Vol. XXX, No. 1

John W. Campbell, Jr., Editor, Catherine Tarrant, Asst. Editor

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WEAPONS AND WAR

During war time, the adage "Knowledge is power" takes on a strictly literal meaning; knowledge becomes the basis of the power-politics which war constitutes. It's perfectly true that, in a world run by creatures with about one one-thousandth of a geological second separating them from the pure animal way of life, all international politics is based on war strength. But that war strength gets pushed more in the background in the breathing spells between direct tests, and in that period free interchange of knowledge proceeds.

The brakes were fully applied to that interchange of scientific knowledge only about the middle of 1940. Of course, as early as 1934 or 1935 the German laboratories had gone under military secrecy control about one hundred percent, releasing information only as it appeared of no great military value, or in return for secrets that seemed more valuable. But American laboratories in general were still open. The university and government laboratories working on industrial problems gave out information freely, except in the few cases where the work was undertaken with army or navy ends directly in view. Industrial laboratories were closed simply against competitors in industry; where Company A made a discovery that was useful only if they could take advantage of another discovery made by B, Incorporated, a *quid pro quo* exchange of data was made—and that, quite naturally, on an industrial, not a ferociously nationalistic basis. In 1934 there were loud grumblings about war merchants and war-minded industrialists who sought to bring on wars to bring them fat profits. Any deals made in those days that showed signs of war-minded inclinations would have been pounced on and denounced from the housetops.

We recognize today the futility of appeasement, of treating truly war-minded beings like Nazis as though they were human beings, people whose minds worked like ours. Industrial laboratories, like the rest of us, made the mistake of thinking they were a little queer, but fundamentally ordinary, reasonable human beings.

So, until 1940, nearly all the science of the democracies was open to the world.

Two years only have passed since the full secrecy of knowledge came into effect. The rate of progress of knowledge from the laboratory apparatus to the militarily useful production machine has been enormously increased by the pressure of need. All available scientists have been thrown into the work of converting known, basic science

into usable devices. The thousands of workers who were, two or three years ago, investigating for new basic knowledge have to considerable degree dropped that task. It's usually fifteen to twenty years between basic discovery and useful mechanism. There's enough unapplied basic science to be put to work now to keep all available technicians busy for the duration of the war. Most of the progress in basic science must be left in suspension.

In many ways, application of scientific knowledge to produce a practicable machine resembles the conversion of the automobile industry to manufacture of airplanes. The automobile industry worked with engines of about one hundred to two hundred horsepower, engines which generated something like one-eighth of a horsepower per pound. They were accustomed to overcoming structural deficiencies by adding more massive bracing, heavier gauge metal, or sturdier shafts.

You don't do that with plane design. The engines develop tens of hundreds of horsepower, and weigh something like one pound for each horsepower. When greater structural strength is needed, the designer must attain it by use of tougher alloys than the already incredibly tough material used—and design the shape of the member in such a way that it can be produced by already existent machine tools. No fancy, intricate cross-bracing structures that are impossible to make commercially. You've seen those Chinese puzzle gadgets with a solid wooden ball inside a wooden cage, all carved from a single solid block of hardwood? The manufacturer has no desire to see that sort of structure in the plans of the plane he's supposed to build. Sure, he could do it, just as the Chinese do it—by infinite patience and skillful handwork. But not on a production line.

The scientist attempting to adapt his discovery to use is faced with exactly comparable problems—plus some new ones. Suppose it's a chemical production job. It's perfectly true that seventy-four tons of calcium hydroxide will neutralize ninety-eight tons of sulphuric acid just as well as seventy-four grams of $\text{Ca}(\text{OH})_2$ will neutralize ninety-eight grams of H_2SO_4 . But when you try neutralizing things by the ton, don't forget to include plenty of provision for heat dissipation—massive heat dissipation.

And you may run into new troubles if your reaction isn't a crude, simple inorganic reaction like that one. Those two substances will react in exactly the same way over a range of temperatures from way below (*Continued on page 108*)

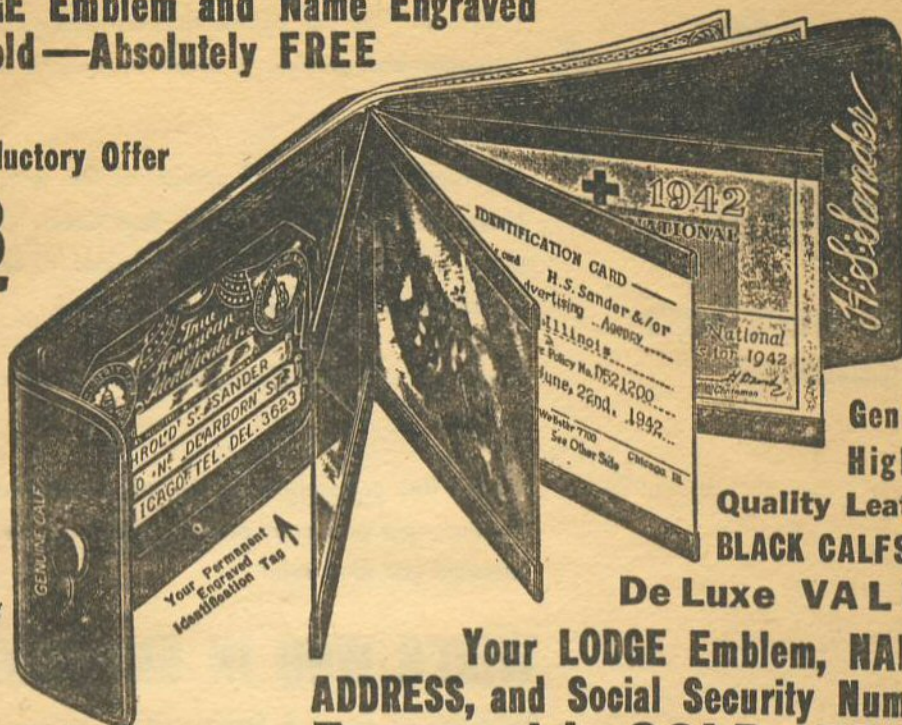
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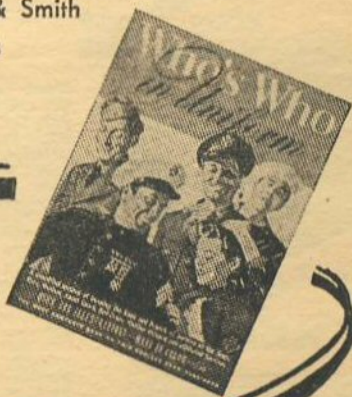
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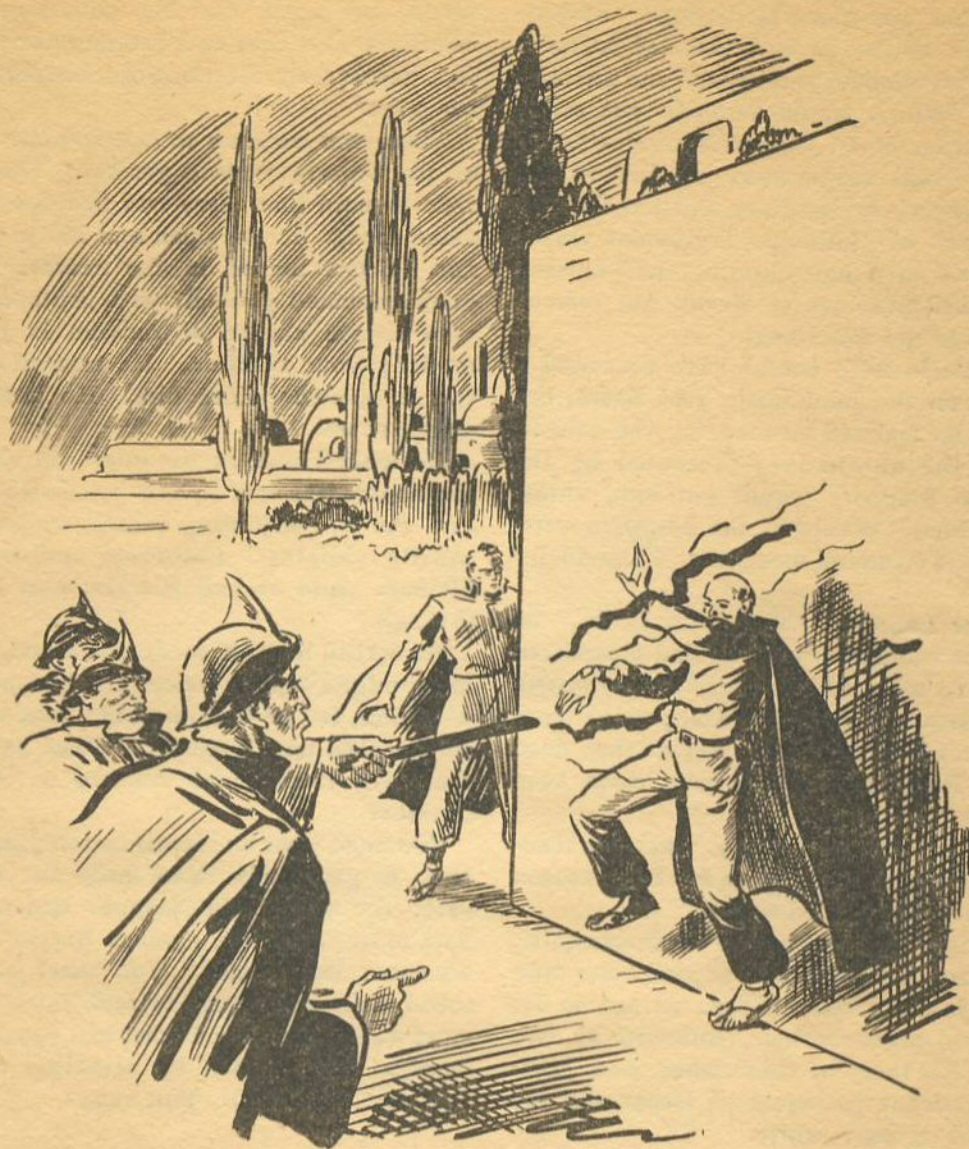
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THE BARRIER

By Anthony Boucher

● If time travel is, or ever will be possible in all time to come—why haven't time travelers appeared? Maybe this famous detective story writer has ferreted out the complete and reasonable solution!

Illustrated by Kolliker

The first difficulty was with language.

That is only to be expected when you jump five hundred years; but it is nonetheless perplexing to have your first casual query of: "What city is this?" answered by the sentence: "Stappers will get you. Or be you Slanduch?"

It was significant that the first word John Brent heard in the State was "Stappers." But Brent could not know that then. It was only some hours later and fifty years earlier that he learned the details of the Stapper system. At the moment all that concerned him was food and plausibility.

His appearance was plausible enough. Following Derringer's advice he had traveled naked—"the one costume common to all ages," the scientist had boomed; "Which would astonish you more, lad: a naked man, or an Elizabethan courtier in full apparel?"—and commenced his life in the twenty-fifth century by burglary and the theft of a complete outfit of clothing. Iridescent woven plastics tailored in a half-clinging, half-flowing style that looked precious to Brent, but seemed both comfortable and functional.

No man alive in 2473 would have bestowed a second glance on the feloniously clad Brent, but in his speech, he realized at once, lay the danger. He pondered the alternatives presented by the stranger. The Stappers would get him, unless he was a Slanduch. Whatever the Stappers were, things that Get You sound menacing. "Slanduch," he replied.

The stranger nodded. "That bees O. K.," he said, and Brent wondered what he had committed himself to. "So what city is this?" he repeated.

"Bees," the stranger chided. "Stappers be more severe now since Edict of 2470. Before they doed pardon some irregularities, but now none even from Slanduch."

"I be sorry," said Brent humbly, making a mental note that irregular verbs were for some reason perilous. "But for the third time—"

He had thought the wall beside them was solid. He realized now that part of it, at least, was only a deceptive glasslike curtain that parted to let forth a tall and vigorous man, followed by two shorter aids. All three of these wore robes similar to the iridescent garments of Brent and his companion, but of pure white.

The leader halted and barked out, "George Starvel?"

Brent saw a quiet sort of terror begin to grow on his companion's face. He nodded and held out his wrist.

The man in white glanced at what Brent decided must be an identification plaque. "Starvel," he announced, "you speaked against Barrier."

Starvel trembled. "Cosmos knows I doed not." "Five mans know that you doed."

"Never. I only sayed—"
"You only! Enough!"

The rod appeared in the man's hand only for an instant. Brent saw no flame or discharge, but Starvel was stretched out on the ground and the two aids were picking him up as callously as though he were a log.

The man turned toward Brent, who was taking no chances. He flexed his legs and sprang into the air. His fingertips grasped the rim of the balcony above them, and his feet shot out into the white-robed man's face. His arm and shoulder muscles tensed to their utmost. The smooth plastic surface was hell to keep a grip on. Be-

neath, he could see his adversary struggling blindly to his feet and groping for the rod. At last, desperately, Brent swung himself up and over the edge.

There was no time to contemplate the beauties of the orderly terrace garden. There was only time to note that there was but one door, and to make for it. It was open and led to a long corridor. Brent turned to the nearest door. Once you've damned yourself with Authority, any private citizen chosen at random is preferable to meeting your nemesis. He started at the door, and it opened before him. He hurried into an empty room.

He looked back at the door. It was shut now, and no one was near to have touched it. He peered into the two adjoining rooms, whose doors were equally obliging. Bathroom and bedroom. No kitchen. And no exit but the door he had come through.

He forced himself to sit down and think. Anything might happen before the Stapper caught up with him, for he had no doubt that was what the white-robed man must be. What had he learned about the twenty-fifth century in this brief encounter?

You must wear an identification plaque. (Memo: How to get one?) You must not use irregular verbs (or nouns; the Stapper had said "mans"). You must not speak against Barrier, whoever or whatever that meant. You must beware white-robed men who lurk behind false walls. You must watch out for rods that kill (query: or merely stun?). Doors open by selenium cells (query: how do they lock?). You must—

The door opened. But it was not the Stapper who stood there, but a tall and majestic woman of, at a guess, sixty. A noble figure—"Roman matron" were the words that flashed into Brent's mind.

The presence of a total stranger in her apartment seemed nowise disconcerting. She opened her arms in a broad gesture of welcome. "John Brent!" she exclaimed in delighted recognition. "It has beed so long!"

"I don't want a brilliant young scientific genius!" Derringer had roared when Brent answered his cryptically worded ad. "I've got 'em here in the laboratory. They've done grand work on the machine. I couldn't live without 'em, and there's not a one of 'em I'd trust out of this century. Not out of this decade. What I want is four things: A knowledge of history, for a background of analogy to understand what's been going on; linguistic ability, to adjust yourself as rapidly as possible to the changes in language; physical strength and dexterity, to get yourself out of the scrapes that are bound to come up; and social adaptability. A chimpanzee of reasonably sub-

human intelligence could operate the machine. What counts is what you'll be able to do and learn after you get there."

The knowledge of history and the physical qualities had been easy to demonstrate. The linguistic ability was a bit more complex; Derringer had contrived an intricate series of tests involving adjustment to phonetic changes and the capacity to assimilate the principles of a totally fictitious language invented for the occasion. The social adaptability was measured partly by an aptitude test, but largely, Brent guessed, by Derringer's own observation during the weeks of preparation after his probationary hiring.

He had passed all four requirements with flying colors. At least Derringer had grinned at him through the black beard and grunted the reluctant, "Good man!" that was his equivalent of rhapsodic praise. His physical agility had already stood him in good stead, and his linguistic mind was rapidly assimilating the new aspects of the language (there were phonetic alterations as well as the changes in vocabulary and inflection—he was particularly struck by the fact that the vowels *a* and *o* no longer possessed the diphthongal off-glide so characteristic of English, but were pure vowels like the Italian *e* and *o*), but his social adaptability was just now hitting a terrific snag.

What the hell do you do when a Roman matron whom you have never seen, born five hundred years after you, welcomes you by name and exclaims that it has been a long time? (This regular past participle of *be*, Brent reflected, gives the speaker something the quality of a Bostonian with a cold in the nose.)

For a moment he toyed with the rash notion that she might likewise be a time traveler, someone whom he had known in 1942. Derringer had been positive that this was the first such trip ever attempted; but someone leaving the twentieth century later might still be an earlier arrival in the twenty-fifth. He experimented with the idea hesitantly.

"I suppose," Brent ventured, "you could call five hundred years a long time, in its relative way."

The Roman matron frowned. "Do not jest, John. Fifty years be not five hundred. I will confess that first five years seemed at times like five centuries, but after fifty—one does not feel so sharply."

Does was of course pronounced *dooze*. All *r*'s, even terminal, were lightly trilled. These facts Brent noted in the back of his mind, but the fore part was concerned with the immediate situation. If this woman chose to accept him as an acquaintance—it was nowise unlikely that his double should be wandering about in this century—it meant probable protection from the Stapper. His

logical mind protested, "Could this double have your name?" but he shushed it.

"Did you," he began, and caught himself. "Doed you see anyone in the hall—a man in white?"

The Roman matron moaned. "Oh, John! Do Stappers seek you again? But of course. If you have come to destroy Barrier, they must destroy you."

"Whoa there!" Brent had seen what happened to one person who had "spoken against Barrier." "I didn't . . . doedn't . . . say anything against Barrier. Not me."

The friendliness began to die from her clear blue eyes. "And I believed you," she said sorrowfully. "You telled us of this second Barrier and swore to destroy it. We thinked you beed one of us. And now—"

No amount of social adaptability can resist a sympathetic and dignified woman on the verge of tears. Besides, this apartment was for the moment a valuable haven, and if she thought he was a traitor of some sort—

"Look," said Brent. "You see, I am—there isn't any use at this moment trying to be regular—I am not whoever you think I am. I never saw you before. I couldn't have conceivably. Because this is the first instant I've ever been in your time."

"If you wish to lie to me, John—"

"I'm not lying. And I'm not John—at least not the one you're thinking of. I'm John Brent, I'm twenty-eight years old, and I was born in 1914—a good five and a half centuries ago."

You'd think a remark like that would have some effect. It sounds like an impressive curtain line. There should at least be a tableau of stunned reaction. But the Roman matron simply stared at him sadly and murmured, "I know, John, I know. Then why do you deny me and all our plans? What will Stephen think?"

The amazement turned out to be Brent's. "You . . . you know that I'm a time traveler?"

"John, my dear, why be you so foolish? You be safe from Stappers here. Stephen has treated walls against listening. And you know that to admit to being time traveler is as dangerous as to admit your plans against Barrier. Trust me, John."

"For some unknown reason, madam, I do trust you. That's why I'm telling you everything. I'm asking you to be my ally. And you persist in—"

The door opened. The man who entered was as tall as the Stapper, but wore the civilian's iridescent robes. His long beard seemed to have caught a little of their rainbow influence; it was predominantly red, but brown and black and white glinted in it. The hair on his head was graying. He might have been anywhere from forty-five to a vigorous and well-preserved seventy.

"We have a guest, sister?" he asked politely.

The Roman matron made a despairing gesture. "You don't recognize him? And John—you don't know Stephen?"

Stephen slapped his thigh and barked—a sound that seemed to represent a laugh of pleasure. "Cosmos!" he cried. "John Brent! I told you, Martha. I knew he wouldn't fail us."

"Stephen!" she exclaimed in shocked tones.

"Hang the irregularities! Can't I greet John with the old words that comed—no, by Cosmos—came from the same past he came from? See, John—don't I talk the old language well? I even use article—pardon me, *the* article."

Brent's automatic mental notebook recorded the fact, which he had already suspected, that an article was as taboo as an irregular verb. But around this self-governing notation system swirled utter confusion. It might possibly have been just his luck to run into a madwoman. But two mad brains in succession with identical delusions were too much. And Stephen had known he was from the past, with no cue given him.

"I'm afraid," he said simply, "this is too much for me. Suppose we all sit down and have a drink of something and talk this over."

Stephen smiled. "You remember our bond, eh? And not many places in State you'll find it. Even fewer than before." He crossed to a cabinet and returned with three glasses of colorless liquid.

Brent seized his eagerly and downed it. A drink might help the swirling. It might—The drink had gone down smoothly and tastelessly. Now, however, some imp began dissecting atoms in his stomach and shooting off a bombardment stream of particles that zoomed up through his throat into his brain, where they set off a charge of explosive of hitherto unknown power. Brent let out a strangled yelp.

Stephen barked again. "Good bond, eh, John?"

Brent managed to focus his host through the blurring lens of his tears. "Sure," he nodded feebly. "Swell. And now let me try to explain—"

The woman looked sadly at her brother. "He denies us, Stephen. He says that he has never seed me before. He forgets all that he ever swore about Barrier."

A curious look of speculation came into Stephen's brown eyes. "Bees this true, John? You have never seed us before in your life?"

"But, Stephen, you know—"

"Hush, Martha. I sayered in *his* life. Bees it true, John?"

"It bees. God knows it bees. I have never seen . . . seed either of you in my life."

"But Stephen—"

"I understand now, Martha. Remember when he telled us of Barrier and his resolve?"

"Can I forget?"

"How doed he know of Barrier? Telle me that."

"I don't know," Martha confessed. "I have wondered—"

"He knowed of Barrier then because he bees here now. He telled me then just what we must now tell him."

"Then for Heaven's sake," Brent groaned, "telle me."

"Your pardon, John. My sister bees not so quick to grasp source of these temporal confusions. More bond?" He had the bottle in his hand when he suddenly stopped, thrust it back in the cabinet, and murmured, "Go into bedroom."

Brent obeyed. This was no time for displaying initiative. And no sooner had the bedroom door closed behind him than he heard the voice of the Stapper. (The mental notebook recorded that apartment buildings must be large, if it had taken this long for the search to reach here.)

"No," Stephen was saying. "My sister and I have beed here for past half-hour. We seed no one."

"State thanks you," the Stapper muttered so casually that the phrase must have been an official formula. His steps sounded receding. Then they stopped, and there was the noise of loud sniffs.

"Dear God," thought Brent, "have they crossed the bulls with bloodhounds?"

"Bond," the Stapper announced.

"Dear me," came Martha's voice. "Who has beed in here today, Stephen?"

"I'm a homeopath," said the Stapper. "Like cures like. A little bond might make me forget I smelled it."

There was a bark from Stephen and a clink of glasses. No noise from either of them as they downed the liquor. Those, sir, were men. (Memo: Find out why such unbelievable rotgut is called *bond*, of all things.)

"State thanks you," said the Stapper, and laughed. "You know George Starvel, don't you?"

A slightly hesitant "Yes" from Stephen.

"When you see him again, I think you'll find he has changed his mind. About many things."

There was silence. Then Stephen opened the bedroom door and beckoned Brent back into the living room. He handed the time traveler a glass of bond and said, "I will try to be brief."

Brent, now forewarned, sipped gingerly at the liquor and found it cheerfully warming as he assimilated the new facts.

In the middle of the twenty-fourth century, he learned, civilization had reached a high point of comfort, satisfaction, achievement—and stagnation. The combination of atomic power and De Bainville's revolutionary formulation of the principles of labor and finance had seemed to solve all economic problems. The astounding development of synthetics had destroyed the urgent need for raw materials and colonies and abolished the

distinction between haves and have-nots among nations. Schwarzwald's "Compendium" had achieved the dream of the early Encyclopedists—the complete systematization of human knowledge. Farthing had regularized the English language, an achievement paralleled by the work of Zinsmeister, Timofeov, and Tamayo y Sárate in their respective tongues. (These four languages now dominated the earth. French and Italian had become corrupt dialects of German, and the Oriental languages occupied in their own countries something the position of Greek and Latin in nineteenth-century Europe, and doomed soon to the complete oblivion which swallowed up those classic tongues in the twenty-first.)

There was nothing more to be achieved. All was known, all was accomplished. Nakamura's Law of Spacial Acceleration had proved interplanetary travel to be impossible for all time. Charnwood's Law of Temporal Metabolism had done the same for time travel. And the Schwarzwald "Compendium," which everyone admired and no one had read, established such a satisfactory and flawless picture of knowledge that it was obviously impossible that anything remained to be discovered.

It was then that Dyce-Farnsworth proclaimed the Stasis of Cosmos. A member of the Anglo-Physical Church, product of the long contemplation by English physicists of the metaphysical aspects of science, he came as the prophet needed to pander to the self-satisfaction of the age.

He was curiously aided by Farthing's laws of regularity. The article, direct or indirect, Farthing had proved to be completely unnecessary—had not languages as world-dominant as Latin in the first centuries and Russian in the twenty-first found no need for it?—and semantically misleading. "Article," he had said in his final and comprehensive study "This Bees Speech," "bees prime corruptor of human thinking."

And thus the statement so beloved in the twentieth century by metaphysical-minded scientists and physical-minded divines, "God is the cosmos," became with Dyce-Farnsworth "God bees cosmos," and hence, easily and inevitably, "God bees Cosmos," so that the utter scientific impersonality became a personification of Science. Cosmos replaced Jehovah, Baal and Odin.

The love of Cosmos was not man nor his works, but Stasis. Man was tolerated by Cosmos that he might achieve Stasis. All the millenniums of human struggle had been aimed at this supreme moment when all was achieved, all was known, and all was perfect. Therefore this supernal Stasis must at all costs be maintained. Since Now was perfect, any alteration must be imperfect and taboo.

From this theory logically evolved the State, whose duty was to maintain the perfect Stasis of

Cosmos. No totalitarian government had ever striven so strongly to iron out all doubt and dissension. No religious bigotry had ever found heresy so damnable and worthy of destruction. The Stasis must be maintained.

It was, ironically, the aged Dyce-Farnsworth himself who, in a moment of quasi-mystical intuition, discovered the flaw in Charnwood's Law of Temporal Metabolism. And it was clear to him what must be done.

Since the Stasis of Cosmos did not practice time travel, any earlier or later civilization that did so must be imperfect. Its emissaries would cause imperfection. There must be a Barrier.

The mystic went no further than that dictum, but the scientists of the State put his demand into practical terms. "Do not ask how at this moment," Stephen added. "I be not man to explain that. But you will learn." The first Barrier was a failure. It destroyed itself and to no apparent result. But now, fifty years later, the fears of time travel had grown. The original idea of the imperfection of emissaries had been lost. Now time travel was in itself imperfect and evil. Any action taken against it would be an offering of praise to Cosmos. And the new Barrier was being erected.

"But John knows all this," Martha protested from time to time, and Stephen would shake his head sadly and smile sympathetically at Brent.

"I don't believe a word of it," Brent said at last. "Oh, the historical outline's all right. I trust you on that. And it works out so sweetly by analogy. Take the religious fanaticism of the sixteenth century, the smug scientific self-satisfaction of the nineteenth, the power domination of the twentieth—fuse them and you've got your State. But the Barrier's impossible. There's no principle on which it could work, and nuts to it."

"Charnwood claimed there beed no principle on which time travel canned work. And here you be."

"That's different," said Brent vaguely. "But all this talk of destroying the Barrier is nonsense. There's no need to."

"Indeed there bees need, John. For two reasons: one, that we may benefit by wisdom of travelers from other ages; and two, that positive act of destroying this Barrier, which bees worshiped now with something like fetishism, bees strongest weapon with which can strike against State. For there be these few of us who hope to save mankind from this fanatical complacency that race haves falled into. George Starvel beed one," Stephen added sadly.

"I saw Starvel— But that isn't what I mean. There's no need because the Barrier won't work."

"But you telled us that it haved to be destroyed," Martha protested. "That it doed work, and that we—"

"Hush," said Stephen gently. "John, will you trust us far enough to show us your machine? I think I can make matters clearer to Martha then."

"If you'll keep me out of the way of Stappers."

"That we can never guarantee—yet. But day will come when mankind cans forget Stappers and State, that I swear." There was stern and noble courage in Stephen's face and bearing as he drained his glass of bond to that pledge.

"I had a break when I landed here," John Brent explained on the way. "Derringer equipped the machine only for temporal motion. He explained that it meant running a risk; I might find that the coast line had sunk and I'd arrive under water, or God knows what. But he hadn't worked out the synchronized adjustment for temporo-spacial motion yet, and he wanted to get started. I took the chance, and luck was good. Where the Derringer lab used to be is now apparently a deserted warehouse. Everything's dusty and not a sign of human occupation."

Stephen's eyes lit up as they approached the long low building of opaque bricks. "Remember, Martha?"

Martha frowned and nodded.

Faint light filtered through the walls to reveal the skeletal outlines of the machine. Brent switched on a light on the panel which gave a dim glow.

"There's not much to see even in a good light," he explained. "Just these two seats—Derringer was planning on teams when he built it, but decided later that one man with sole responsibility to himself would do better—and this panel. These instruments are automatic—they adjust to the presence of another machine ahead of you in the time line. The only control the operator bothers with is this." He indicated the double dial set at 2473.

"Why did you choose this year?"

"At random. Derringer set the outer circle at 2400—half a millennium seemed a plausible choice. Then I spun the inner dial blindfold. When this switch here is turned, you create a certain amount of temporal potential, positive or negative—which is as loose as applying those terms to magnetic poles, but likewise just as convenient. For instance if I turn it to here"—he spun the outer dial to 2900—"you'll have five hundred years of positive potential which'll shoot you ahead to 2973. Or set it like this, and you'll have five centuries of negative, which'll pull you back practically to where I started from."

Stephen frowned. "Ahead and back be of course nonsense words in this connection. But they may be helpful to Martha in visualizing it. Will you please show Martha the back of your dial?"

"Why?" There was no answer. Brent shrugged

and climbed into the seat. The Roman matron moved around the machine and entered the other seat as he loosed the catch on the dial and opened it, as one did for oiling the adjusting gears.

Stephen said, "Look well, my dear. What be the large wheels maked of?"

"Aceroid, of course. Don't you remember how Alex—"

"Don't remember, Martha. Look. What be they?"

Martha gasped. "Why, they . . . they be pure aluminum."

"Very well. Now don't you understand—*Ssh!*" He broke off and moved toward the doorway. He listened there a moment, then slipped out of sight.

"What does he have?" Brent demanded as he closed the dial. "The ears of an elkhound?"

"Stephen haves hyperacute sense of hearing. He bees proud of it, and it haves saved us more than once from Stappers. When people be engaged in motive work against State—"

A man's figure appeared again in the doorway. But its robes were white. "Good God!" Brent exclaimed. "Jiggers, the Staps!"

Martha let out a little squeal. A rod appeared in the Stapper's hand. Brent's eyes were so fixed on the adversary that he did not see the matron's hand move toward the switch until she had turned it. Then he shut his eyes and groaned.

Brent had somehow instinctively shut his eyes during his first time transit. *During*, he reflected, is not the right word. *At the time of?* Hardly. How can you describe an event of time movement without suggesting another time measure perpendicular to the time line? At any rate, he had shut them in a laboratory in 1942 and opened them an instant later in a warehouse in 2473.

Now he kept them shut. He had to think for a moment. He had been playing with the dial—where was it set when Martha jerked the switch? 1973, as best he remembered. And he had now burst into that world in plastic garments of the twenty-fifth century, accompanied by a Roman matron who had in some time known him for fifty years.

He did not relish the prospect. And besides he was bothered by that strange jerking, tearing sensation that had twisted his body when he closed his eyes. He had felt nothing whatsoever on his previous trip. Had something gone wrong this time? Had—

"It doesn't work!" said Martha indignantly.

Brent opened his eyes. He and Martha sat in the machine in a dim warehouse of opaque brick.

"We be still here," she protested vigorously.

"Sure we're still here." Brent frowned. "But what you mean is, we're still *now*."

"You talk like Stephen. What do you mean?"

"Or are we?" His frown deepened. "If we're still now, where is that Stapper? He didn't vanish just because you pulled a switch. How old is this warehouse?"

"I don't know. I think about sixty years. It beed fairly new when I beed a child. Stephen and I used to play near here."

"Then we could have gone back a few decades and still be here. Yes, and look—those cases over there. I'd swear they weren't here before. After. Whatever. Then, when we saw the Stapper." He looked at the dial. It was set to 1973. And the warehouse was new some time around 2420.

Brent sat and stared at the panel.

"What bees matter?" Martha demanded. "Where be we?"

"Here, same like always. But what bothers me is just *when* we are. Come on; want to explore?"

Martha shook her head. "I want to stay here. And I be afraid for Stephen. Doed Stappers get him? Let's go back."

"I've got to check up on things. Something's gone wrong, and Derringer'll never forgive me if I don't find out what and why. You stay here if you want."

"Alone?"

Brent suppressed several remarks concerning women, in the abstract and the particular. "Stay or go, I don't care. I'm going."

Martha sighed. "You have changed so, John—"

In front of the warehouse was an open field. There had been buildings there when Brent last saw it. And in the field three young people were picnicking. The sight reminded Brent that it was a long time since he'd eaten. How you could measure gaps between meals when you shoot about among centuries, he didn't know; but he was hungry.

He made toward the trio. There were two men and a girl. One man was blond, the other and the girl were brilliantly red-headed. The girl had much more than even that hair to recommend her. She— Brent's eyes returned to the red-headed man. There was no mistaking those deep brown eyes, that sharp and noble nose. The beard was scant, but still there was no denying—

Brent sprang forward with an eager cry of "Stephen!"

The young man looked at him blankly. "Yes," he said politely. "What do you want?"

Brent mentally kicked himself. He had met Stephen in advanced age. What would the Stephen of twenty know of him? And suddenly he began to understand a great deal. The whole confusion of that first meeting started to fade away.

"If I tell you," he said rapidly, "that I know that you be Stephen, that you have sister Martha,

that you drink bond despite Stappers, and that you doubt wisdom of Barrier, will you accept me as a man you can trust?"

"Cosmic æons!" the blond young man drawled. "Stranger knows plenty, Stephen. If he bees Stapper, you'll have your mind changed."

The scantily bearded youth looked a long while into Brent's eyes. Then he felt in his robe, produced a flask, and handed it over. Brent drank and returned it. Their hands met in a firm clasp.

Stephen grinned at the others. "My childs, I think stranger brings us adventure. I feel like someone out of novel by Varnichek." He turned back to Brent. "Do you know these others, too?"

Brent shook his head.

"Krasna and Alex. And your name?"

"John Brent."

"And what can we do for you, John?"

"First tell me year."

Alex laughed, and the girl smiled. "And how long have you beed on a bonder?" Alex asked.

A bonder, Brent guessed, would be a bond bender. "This bees my first drink," he said, "since 1942. Or perhaps since 2473, according as how you reckon."

Brent was not disappointed in the audience reaction this time.

It's easy to see what must have happened, Brent wrote that night in the first entry of the journal Derringer had asked him to keep. He wrote longhand, an action that he loathed. The typewriter which Stephen had kindly offered him was equipped with a huge keyboard bearing the forty-odd characters of the Farthing phonetic alphabet, and Brent declined the loan.

We're at the first Barrier—the one that failed. It was dedicated to Cosmos and launched this afternoon. My friends were among the few inhabitants not ecstatically present at the ceremony. Since then they've collected reports for me. The damned contrivance had to be so terrifically overloaded that it blew up. Dyce-Farnsworth was killed and will be a holy martyr to Cosmos forever.

But in an infinitesimal fraction of a second between the launching and the explosion, the Barrier existed. That was enough. It is gone now. It is of no use to protect the people of this smug and sacred Stasis from raids from a more human future. But it existed at that one point in time, existed effectively enough to stop me dead.

Which makes keeping this journal, my dear Dr. Derringer, a magnificently silly act. In all likelihood neither you nor anyone else before 2423 will ever see it. (Will ever have seen it?) But you see, sir, I obey instructions. Nice of me, isn't it?

And I've been finding out all I can. Stephen is



good on history, but lousy on science. The blond young Alex reverses the combination. From him I've learned, or tried to learn, the theory back of the Barrier.

The Barrier established, in that fractional second, a powerful magnetic field in the temporal dimension. As a result, any object moving along the time line is cutting the magnetic field. Hysteresis sets up strong eddy currents which bring the object, in this case me, to an abrupt halt. Cf. that feeling of twisting shock that I had when my eyes were closed.

I pointed out to Alex that I must somehow have crossed this devilish Barrier in going from 1942 to 2473. He accounts for that apparent inconsistency by saying that I was then traveling with the time stream, though at a greater rate; the blockage lines of force were end-on and didn't stop me.

Brent paused and read the last two paragraphs aloud to the young scientist who was tinkering

with the traveling machine. "How's that, Alex? Clear enough?"

"It will do." Alex frowned. "Of course we need whole new vocabulary for temporal concepts. We fumble so helplessly in analogies—" He rose. "There bees nothing more I can do for this now. Tomorrow I'll bring out some tools from shop, and see if I can find some aceroid gears to fit control."

"Good man. I may not be able to go back in time from here; but one thing I can do is go forward. Forward to just before they launch that second Barrier. I've got a job to do."

Alex gazed admiringly at the machine. "Wonderful piece of work. Your Dr. Derringer bees great man."

"Only he didn't allow for the effects of tempromagnetic hysteresis on his mechanism. Thank God for you, Alex."

"Willn't you come back to house?"

Brent shook his head. "I'm taking no chances

on curious Stappers. I'm sticking here with Baby. See that the old lady's comfortable, will you?"

"Of course. But tell me: who bees she? She willn't talk at all."

"Nobody. Just a temporal hitchhiker."

Martha's first sight of the young Stephen had been a terrible shock. She had stared at him speechlessly for long minutes, and then gone into a sort of inarticulate hysteria. Any attempt at explanation of her status, Brent felt, would only make matters worse. There was nothing to do but leave her to the care—which seemed both tender and efficient—of the girl Krasna, and let her life ride until she could resume it normally in her own time.

He resumed his journal:

Philological notes: Stapper, as I should have guessed, is a corruption of Gestapo. Slanduch, which poor Starvel suggested I might be, had me going for a bit. Asking about that, learned that there is more than one State. This, the smuggest and most fanatical of them all, embraces North America, Australia, and parts of Eastern Asia. Its official language is, of course, Farthingized English. Small nuclear groups of English-speaking people exist in the other States, and have preserved the older and irregular forms of speech. (Cf. American mountaineers, and Spanish Jews in Turkey.) A Slanduch is a member of one of these groups.

It took me some time to realize the origin of this word, but it's obvious enough: Auslandsdeutsche, the Germans who existed similarly cut off from the main body of their culture. With these two common loan words suggesting a marked domination at some time of the German language, I asked Alex—and I must confess almost fearfully—"Then did Germany win the war?"

He not unnaturally countered with, "Which war?"

"The Second World War. Started in 1939."

"Second— Cosmic æons, John, you can't expect me to remember numbers of all those twentieth-century World Wars, can you?"

I am almost afraid to ask the more historically accurate Stephen.

Brent paused, and wished for Stephen's ears to determine the nature of that small noise outside. Or was it pure imagination? He went on:

These three—Stephen, Alex, and Krasna—have proved to be the ideal hosts for a traveler of my nature. Any devout believer in Cosmos, any loyal upholder of the Stasis would have turned me over to the Stappers for my first slip in speech or ideas.

They seem to be part of what corresponds to the Underground Movements of my own century. They try to accomplish a sort of boring from within, a subtle sowing of doubts as to the Stasis.

Eventually they hope for more positive action; so far it is purely mental sabotage.

Their motives are various. Some are crackpots, pure and simple. Some are artists who rebel against the limitations imposed by the State. Some are scientists who remain unconvinced that Schwarzwald solved everything. Stephen says simply that he is a Christian—which most of the others consider an almost comic anachronism—and that Cosmos is a false god; but I think the Christian love of mankind is a stronger motive force in him than any doctrinary matter of the rivalry of names for godhead. Alex is a Seepy—a word the meaning of which I haven't yet been able to gather. Krasna—

It was a noise. Brent set down his stylus and moved along the wall as quietly as possible to the door. He held his breath while the door slid gently inward. Then as the figure entered, he pounced.

Stappers have close-cropped hair and flat manly chests. Brent released the girl abruptly and muttered a confused apology.

"It bees only me," she said shyly. "Krasna. Doed I startle you?"

"A bit," he confessed. "Alex and Stephen warned me what might happen if a Stapper stumbled on my machine here."

"I be sorry, John."

"It's all right. But you shouldn't be wandering around alone at night like this. In fact, you shouldn't be mixed up in this at all. Leave it to Stephen and Alex and me."

"Mans!" she pouted. "Don't you think womans have any right to fun?"

"I don't know that fun's exactly the word. But since you're here, milady, let me extend the hospitality of the camp. Alex left me some bond. That poison grows on you. And tell me, why's it called that?"

"Stephen telled me once, but I can't— Oh yes. When they prohibited all drinking because drinking makes you think world bees better than it really bees and of course if you make yourself different world that bees against Stasis and so they prohibited it but they keeoped on using it for medical purposes and that beed in warehouses and pretty soon no one knowed any other kind of liquor so it bees called bond. Only I don't see why."

"I don't suppose," Brent remarked, "that anybody in this century has ever heard of one Gracie Allen, but her spirit is immortal. The liquor in the warehouses was probably kept under government bond."

"Oh—" she said meekly. "I'll remember. You know everything, don't you?"

Brent looked at her suspiciously, but there was no irony in the remark. "How's the old lady getting on?"

"Fine. She bees sleeping now at last. Alex gived her some dormitin. She bees nice, John."

"And yet your voice sounds worried. What's the matter?"

"She bees so much like my mother only, of course, I don't remember my mother much because I beed so little when Stappers taked my father and then my mother doedn't live very long but I do remember her some and your old lady bees so much like her. I wish I haved knowed my mother goodlier, John. She beed dear. She—" She lowered her voice in the tone of one imparting a great secret. "She cooked!"

Brent remembered their tasteless supper of extracts, concentrates, and synthetics, and shuddered. "I wish you had known her, Krasna."

"You know what cooking means? You go out and you dig up roots and you pick leaves off of plants and some people they even used to take animals, and then you apply heat and—"

"I know. I used to be a fair-to-middling cook myself, some five hundred years ago. If you could lead me to a bed of coals, a clove of garlic, and a two-inch steak, milady, I'd guarantee to make your eyes pop."

"Garlic? Steak?" Her eyes were wide with wonder. "What be those?"

Brent explained. For ten minutes he talked of the joys of food, of the sheer ecstatic satisfaction of good eating that passes the love of woman, the raptures of art, or the wonders of science. Then her questions began to pour forth.

"Stephen learns things out of books and Alex learns things in lab but I can't do that so goodly and they both make fun of me only you be real and I can learn things from you, John, and it bees wonderful. Tell me—"

And Krasna, with a greedy ear, devoured up his discourse.

"—and men were free," he ended. "Free to damn and ruin themselves if they choose, but free also to live nobly, enriching the world and themselves by their striving. For all perfection comes from within, and the 'perfection' that is imposed from without is as frivolous and stupid as the trimmings on gingercake. The free man may be bad, but only the free man can be good. And all the kingdom and the power and the glory—call it of God, call it of Cosmos—must arise from the free will of man."

He stopped, somewhat surprised at his own eloquence. The tyrannical smugness of this age was working upon him powerfully.

Krasna was kneeling at his feet. He could feel the warmth of her young body against his. "Go on," she whispered. Her large eyes glowed up at him.

"That's all. And damned if I know how I talked that long." His hand rested on the soft mass of her flowing red hair.

"You be wonderful," she murmured.

Brent coughed and said, "Nuts!" His hand stroked her head gently.

The rest of that evening was not recorded in the Derringer journal.

The machine was not repaired the next day, nor the next. Alex kept making plausible, if not quite intelligible, technical excuses. Martha kept to her room and fretted; but Brent rather welcomed the delay. There was no hurry; leaving this time several days later had no effect on when they reached 2473. But he had some difficulty making that point clear to the matron.

This delay gave him an opportunity to see something of the State in action, and any information acquired was apt to be useful when the time came. With various members of Stephen's informal and illicit group he covered the city. He visited a Church of Cosmos and heard the official doctrine on the failure of the Barrier—the Stasis of Cosmos did not permit time travel, so that even an attempt to prohibit it, by recognizing its existence affronted the Stasis. He visited libraries and found only those works which had established or upheld the Stasis, all bound in the same uniform format which the Cosmic Bibliological Committee of 2407 had ordained as ideal and static. He visited scientific laboratories, and found brilliant young dullards plodding away endlessly at what had already been established; imaginative research was manifestly perilous.

He heard arid stretches of intolerable music composed according to the strict Farinelli system, which forbade, among other things, any alteration of key or time for the duration of a composition. He went to a solly, which turned out to be a deceptively solid three-dimensional motion picture. It was a flat and undramatic exposition of the glories of Stasis; but Brent suspected the author of being an Undergrounder. The villain, even though triumphantly bested by the Stappers in the end, had all the most plausible and best written speeches, some of them ingenious and strong enough to sow doubts in the audience.

If, Brent thought disgustedly, anything could sow doubts in this smug herd of cattle. For the people of the State seemed to take the deepest and most loving pride in everything pertaining to the State and to the Stasis of Cosmos. The churches, the libraries, the laboratories, the music, the sollies, all represented humanity at its highest peak. We have attained perfection, have we not? Then all this bees perfect, and we love it.

"What we need," he expostulated to Alex and Stephen one night, "is more of me. Lots more. Scads of us pouring in from all ages to light firecrackers under these dopes. Every art and

every science has degenerated far worse than anything did in the Dark Ages. The surface attainment is still there; but everything's gone from under it. Man cannot be man without striving; and all striving is abolished. God, I think if I lived in this age and believed in the Stasis, I'd become a Stapper. Better their arrogant cruelty than the inhuman indifference of everybody else."

"I have brother who bees Stapper," said Stephen. "I do not recommend it. To descend to level of cows and oxes bees one thing. To become wolves and jackals bees another."

"I've gathered that those rods paralyze the nerve centers, right? But what happens to you after that in Stappers' hands?"

"It bees not good. First you be treated according to expert psychoanalytic and psychometric methods so as to alter your concepts and adjust you to Stasis. If that fails, you be carefully reduced to harmless idiocy. Sometimes they find mind that bees too strong for treatment. He bees killed, and Stappers be allowed to play with him first."

Brent shuddered. "Not nice."

"It'll never happen to me," Alex said earnestly. "I be prepared. You see this?" He indicated a minute plastic box suspended around his neck. "It contains tiny amount of radioactive matter sensitized to wave length of Stappers' rods. They will never change my mind."

"It explodes?"

Alex grinned. "Stay away from me if rods start waving."

"It seems," Brent mused, "as though cruelty were the only human vice left. Games are lost, drinking is prohibited—and that most splendid of vices, imaginative speculation, is unheard of. I tell you, you need lots of me."

Stephen frowned. "Before failure of Barrier, we often wondered why we never seed time travelers. We doubted Charnwood's Law and yet—We decided there beed only two explanations. Either time travel bees impossible, or time travelers cannot be seed or intervene in time they visit. Now, of course, we can see that Barrier stopped all from future, and perhaps you be only one from past. And still—"

"Exactly," said Alex. "And still. If other travelers came from future, why beed they not also stopped by Barrier? One of our friends haves haved opportunity to search Stapper records since breakdown of Barrier. No report on strange and unidentified travelers anywhere."

"That cans mean only one thing." Stephen looked worried. "Second Barrier, Barrier you telled us of, John, must be successful."

"The hell it will be. Come on, Alex. I'm getting restless. When can I start?"

Alex smiled. "Tomorrow. I be ready at last."

"Good man. Among us, we are going to blow this damned Stasis back into the bliss of manly and uncertain striving. And in fifty years we'll watch it together."

Krasna was waiting outside the room when Brent left. "I knowed you willed be talking about things I doedn't understand."

"You can understand this, milady. Alex has got everything fixed, and we leave tomorrow."

Krasna put her soft hand gently in his and wordlessly walked back to the warehouse with him.

"Now," said Brent to Stephen after what was euphemistically termed breakfast, "I've got to see the old lady and find out just what the date is for the proposed launching of the second Barrier."

Stephen beamed. "It bees such pleasure to hear old speech, articles and all."

Alex had a more practical thought. "How can you set it to one day? I thinked your dial readed only in years."

"There's a vernier attachment that's accurate—or should be, it's never been tested yet—to within two days. I'm allowing a week's margin. I don't want to be around too long and run chances with Stappers."

"Krasna will miss you."

"Krasna's a funny name. You others have names that were in use back in my day."

"Oh, it bees not name. It bees only what everyone calls red-headed girls. I think it goes back to century of Russian domination."

"Yes," Alex added. "Stephen's sister's real name bees Martha, but we never call her that."

John Brent gaped. "I . . . I've got to go see the old lady," he stammered. "The old lady—the red-head—Martha—Krasna—Stephen's sister—"

Small wonder she was shocked when he didn't know her!

From the window of the gray-haired Martha-Krasna he could see the red-headed Krasna-Martha outside. He held on to a solid and reassuring chair and said, "Well, madam, I have news. We're going back today."

"Oh thank Cosmos!"

"But I've got to find out something from you. What was the date set for the launching of the second Barrier?"

"Let me see— I know it beed holiday. Yes, it beed May 1st."

"My, my! May Day a holiday now? Workers of the World Unite, or simply Gathering Nuts in May?"

"I don't understand you. It bees Dyce-Farnsworth's birthday, of course."

"Oh. Well, be out at the warehouse in half an hour, and we'll be off."

The young Krasna-Martha was alone in the

warehouse when Brent got there. He looked at her carefully, trying to see in her youthful features the worn ones of the woman he had just left. It made sense.

"I comed first," she said, "because I wanted to say good-by without others."

"Good-by, milady," Brent murmured into her fine red hair. "In a way I'm not leaving you because I'm taking you with me and still I'll never see you again. And you don't understand that, and I'm not sure you've ever understood anything I've said, but you've been very sweet."

"And you will destroy Barrier? For me?"

"For you, milady. And a few billion others. And here come our friends."

Alex carried a small box which he tucked under one of the seats. "Dial and mechanism beed repaired days ago," he grinned. "I've beed working on this for you, in lab while I should have been re-proving Tsvetov's hypothesis. Temporal demagnetizer—guaranteed. Bring this near Barrier and field will be breaked. Your problem bees to get near Barrier."

Martha, the matron, climbed into the machine. Martha, the girl, turned away to hide watering eyes. Brent set the dial to 2473 and adjusted the vernier to April 24th, which gave him a week's grace. "Well, friends," he faltered. "My best gratitude—and I'll be seeing you in fifty years."

Stephen started to speak, and then suddenly stopped to listen. "Quick, Krasna, Alex. Behind those cases. Turn switch quickly, John."

Brent turned the switch, and nothing happened. Stephen and Krasna were still there, moving toward the cases. Alex darted to the machine. "Cosmos blast me! I maked disconnection to prevent anyone's tampering by accident. And now—"

"Hurry, Alex," Stephen called in a whisper.

"Moment—" Alex opened the panel and made a rapid adjustment. "There, John. Good-by."

In the instant before Brent turned the switch, he saw Stephen and Krasna reach a safe hiding place. He saw a Stapper appear in the doorway. He saw the flicker of a rod. The last thing he saw in 2423 was the explosion that lifted Alex's head off his shoulders.

The spattered blood was still warm in 2473.

Stephen, the seventy-year-old Stephen with the long and parti-colored beard, was waiting for them. Martha dived from the machine into his arms and burst into dry sobbing.

"She met herself," Brent explained. "I think she found it pretty confusing."

Stephen barked: "I can imagine. It bees only now that I have realized who that woman beed who comed with you and so much resembled our mother. But you be so late. I have beed waiting here ever since I evaded Stappers."

"Alex—" Brent began.

"I know. Alex haves gived you magnetic disruptor and losed his life, poor devil. But that bees fifty-year-old sorrow, and we have no time for it. Why have you beed so long?"

"I didn't want to get here too long before May Day—might get into trouble. So I allowed a week, but I'll admit I might be a day or so off. What date is it?"

"This bees May 1st, and Barrier will be launched within hour. We must hurry."

"My God—" Brent glared at the dial. "It can't be that far off. But come on. Get your sister home and we'll plunge on to do our damnedest."

Martha roused herself. "I be coming with you."

"No, dear," said Stephen. "We can do better alone."

Her lips set stubbornly. "I be coming. I don't understand anything that happens, but you be Stephen and you be John, and I belong with you."

The streets were brightly decorated with banners bearing the double loop of infinity, the sacred symbol of Cosmos that had replaced crescent, swastika, and cross. But there was hardly a soul in sight. What few people they saw were all hurrying in the same direction.

"Everyone will be at dedication," Stephen explained. "Tribute to Cosmos. Those who stay at home must beware Stappers."

"And if there's hundreds of thousands thronging the dedication, how do we get close to Barrier to disrupt it?"

"It bees all arranged. Our group bees far more powerful than when you knowed it fifty years ago. Slowly we be honeycombing system of State. With bribery and force when necessary, with persuasion when possible, we can do much. And we have arranged this."

"How?"

"You be delegate from European Slanduch. You speak German?"

"Well enough."

"Remember that haves beed regularized, too. But I doubt if you need to speak any. Making you Slanduch will account for irregular slips in English. You come from powerful Slanduch group. You will be gladly welcomed here. You will occupy post of honor. I have even accounted for box you carry. It bees tribute you have bringed to Cosmos. Here be your papers and identity plaque."

"Thanks." Brent's shorter legs managed to keep up with the long strides of Stephen, who doubled the rate of the moving sidewalk by his own motion. Martha panted along resolutely. "But can you account for why I'm so late? I set my indicator for April 24th, and here we are rushing to make a date on May 1st."

Stephen strode along in thought, then sud-

denly slapped his leg and barked. "How many months in 1942?"

"Twelve, of course."

"Ha! Yes, it beed only two hundred years ago that thirteen-month calendar beed adopted. Even months of twenty-eight days each, plus Year Day, which belongs to no month. Order, you see. Now invaluable part of Stasis—" He concentrated frowningly on mental arithmetic. "Yes, your indicator worked exactly. May 1st of our calendar bees April 24th of yours."

Chalk up one slip against Derringer—an unthinking confidence in the durability of the calendar. And chalk up one, for Brent's money, against the logic of the Stasis; back in the twentieth century, he had been an advocate of calendar reform, but a stanch upholder of the four-quarter theory against the awkward and indivisible thirteen months.

They were nearing now the vast amphitheater where the machinery of the Barrier had been erected. Stappers were stopping the few other travelers and forcing them off the moving sidewalk into the densely packed crowds, faces aglow with the smug ecstasy of the Stasis, but Brent's Slanduch credentials passed the three through every guard station, with short but infuriating delays.

"We'll make it." Stephen's eyes were afire. "Remember what you sayed to Alex and me? How State needs hundreds of you, to put explosive beneath it and blow it into awareness? If we—" He broke off speaking as they neared another Stapper.

This one looked at the credentials and grinned. "*Also! Sie wesen Slandsdeutsch und zwar aus Deutschland!*" He burst out in Zinsmeisterized German. "*Seit jahre habe ich kein Wort deutsch gehört. Mein eltere wesen von deutsch herkunft.*"

Brent's curious mind recorded the necessary notes on this perverted language, but there was no time to waste. He tried to avoid irregular slips as he replied, "*Freut mich sehr. Aber jetst habe ich kein zeit. Ich müsse eilen. Später vielleicht könne ich—*"

But the Stapper was, for a Stapper, amazingly friendly—a pleasing phenomenon at any other time, but hardly now. He rattled on in this correct speech until Brent glanced around to see that Stephen had precipitated action by dragging Martha on ahead. "*Ach!*" Brent cried. "*Mein freunde wesen schon gegeht. Verzeihen sie!*" And he sped after them.

The representative of the German Slanduch pushed his way into the crowd of eminent dignitaries just as Dyce-Farnsworth's grandson pressed the button. The magnificent mass of tubes and wires shuddered and glowed as the current pulsed

through it. Then the glow became weird and arctic. There was a shaking, a groaning, and then, within the space of a second, a cataclysmic roar and a blinding glare. Something heavy and metallic pressed Brent to the ground.

The roar blended into the excited terror of human voices. The splendid Barrier was a mass of twisted wreckage. It was more wreckage that weighted Brent down, but this was different. It looked strangely like a variant of his own machine. And staring down at him from a warped seat was the enormous and huge-eyed head of a naked man.

A woman in a metallic costume equally strange to this age and to Brent's own straddled the body of Dyce-Farnsworth's grandson, who had met his ancestor's martyrdom. And wherever Brent's eyes moved he saw another strange and outlandish—no, out-time-ish—figure.

He heard Martha's voice. "It bees clear that Time Barrier haves beed erected and destroyed by outside force. But it haves existed and created impenetrable instant of time. These be travelers from all future."

Brent gasped. Even the sudden appearance of these astounding figures was topped by Martha's speaking perfect logical sense.

Brent wrote in his journal: *The Stasis is at least an admirably functional organism. All hell broke loose there for a minute, but almost automatically the Stappers went into action with their rods—odd how that bit of crook's cant has become perfectly literal truth—and in no time had the situation well in hand.*

They had their difficulties. Several of the time intruders were armed, and managed to account for a handful of Stappers before the nerve rays paralyzed them. One machine was a sort of time-traveling tank and contrived to withstand siege until a suicide squad of Stappers attacked it with a load of what Stephen tells me was detonite; we shall never know from what sort of a future the inhabitants of that tank came to spatter their shredded flesh about the amphitheater.

But these events were mere delaying action, token resistance. Ten minutes after the Barrier had exploded, the travelers present were all in the hands of the Stappers, and cruising Stapper bands were efficiently combing all surrounding territory.

(The interesting suggestion comes amazingly from Martha that all time machines capable of physical movement were irresistibly attracted to the amphitheater by the temporomagnetic field. Only such pioneer and experimental machines as my Derringer, which can move only temporally, would be arrested in other locations. Whether or not this theory is correct, it seems justified

by the facts. Only a few isolated reports have come in of sudden appearances elsewhere at the instant of the Barrier's explosion; the focus of arrivals of the time travelers was the amphitheater.)

The Chief of Stappers mounted the dais where an infinity-bedecked banner now covered the martyred corpse of young Dyce-Farnsworth, and announced the official ruling of the Head of State: That these intruders and disrupters of the Stasis were to be detained—tested and examined and studied until it became apparent what the desire of Cosmos might be.

(The Head of State, Stephen explained, is a meaningless figurehead, part high priest and—I paraphrase—part Alexander Throttlebottom. The Stasis is supposedly so perfect and so self-sustaining that his powers are as nominal as those of the pilot of a ship in drydock, and all actual power is exercised by such subordinates as the Editor of State and the Chief of Stappers.)

Thanks to Stephen's ingenuity, this rule for the treatment of time travelers does not touch me. I am simply a Slanduch envoy. (I must remember to polish myself in that highly obnoxious Zinsmeisteriert German.) Some Stapper search party has certainly by now found the Derringer machine in the warehouse, which I no longer dare approach.

With two Barriers now between me and 1942, it is obvious that I am keeping this journal only for myself. I am stuck here—and so are all the other travelers, for this field, far stronger than the first, has wrecked their machines beyond the repairing efforts of a far greater talent than poor Alex. We are all here for good.

And it must be for good.

I still believe firmly what I said to Stephen and Alex: that this age needs hundreds of me to jolt it back into humanity. We now have, if not hundreds, at least dozens; and I, so far as we yet know, am the only one not in the hands of the Stappers. It is my clearest duty to deliver those others, and with their aid to beat some sense into this Age of Smugness.

"But how?" Brent groaned rhetorically. "How am I going to break into the Stappers' concentration camp and set free all these fellow travelers to aid me?"

Martha wrinkled her brows. "I think I know. Let me work on problem while longer; I believe I see how we can at littlest make start."

Brent stared at her. "What's happened to you, madam? Always before you've shrunk away from every discussion Stephen and I have had. You've said we talk of things you know nothing about. And now, all of a sudden—boom!—you're right in the middle of things and doing very nicely thank you. What's got into you?"

"I think," said Martha smiling, "you have hit on right phrase, John."

Brent's puzzled expostulation was broken off by Stephen's entrance. "And where have you been?" he demanded. "I've been trying to work out plans, and I've got a weird feeling Martha's going to beat me to it. What have you been up to?"

Stephen looked curiously at his sister. "I've been out galping. Interesting results, too."

"Galping?"

"You know. Going about among people, taking samples of opinion, using scientific method to reduce carefully choosed samples to general trends."

"Oh." (Mr. Gallup, thought Brent, has joined Captain Boycott and M. Guillotin as a verb.) "And what did you learn?"

"People be confused by arrival of time travelers. If Stasis bees perfect, they argue, why be such arrivals allowed? Seeds of doubt be sowed, and we be carefully watering them. Head of State haves problem on his hands. I doubt if he cans find any solution to satisfy people."

"If only," Brent sighed, "there were some way of getting directly at the people. If we could see these travelers and learn what they know and want, then somehow establish contact between them and the people, the whole thing ought to be a pushover. But we're up against that 'if only—'"

It was Martha who answered. "It bees very simple, John. You be linguist."

"Yes. And how does that—"

"Stappers will need interpreters. You will be one. From there on you must develop your own plans, but that will at littlest put you in touch with travelers."

"But the State must have its own trained linguists who—"

Stephen barked with pleasure and took up the explanation. Since Farthing's regularization of English, the perfect immutability of language had become part of the Stasis. A linguist now was a man who knew Farthing's works by heart, and that was all. Oh, he might also be well acquainted with Zinsmeister German, or Tamayo y Sárate Spanish; but he knew nothing of general linguistic principles, which are apt to run completely counter to the fine theories of these great synthesists, and he had never had occasion to learn adaptability to a new language. Faced by the probably strange and incomprehensible tongues of the remote future, the State linguist would be lost and helpless.

It was common knowledge that only the Slanduch had any true linguistic aptitude. Brought up to speak three languages—Farthing-ized English, their own archaic dialect, and the language of the country in which they resided—

their tongues were deft and adjustable. In ordinary times, this aptitude was looked on with suspicion; ingenuity and cleverness in any field were obviously heretical threats to the Stasis. But now there would doubtless be a heavy demand for Slanduch interpreters, and there was no doubt that a little cautious wire pulling could land Brent the job.

"And after that," said Stephen, "as Martha rightly observes, you be on your own."

"Lead me to it," grinned John Brent.

"Isn't that Starvel?" Brent demanded.

Stephen paused and looked at the man on the other mobile walk. "So it bees indeed."

"The Stappers must have released him. Shall we—"

The man had noticed them and now crossed over. "George!" Stephen cried. "Cosmos! but it rejoices my heart to see you again."

George Starvel held himself aloof and glanced suspiciously at Brent. "I wished to speak to you, Stephen, only to tell you that I will not see you again."

"George!"

"Stasis bees perfect, Stephen. Your ideas for some little time deluded me, but now I know. Cosmos bees all-perfect and his perfection lies in his Stasis. If ever again you try to persuade me of lies to contrary, I will have to advise Stappers. Good-by." And he had left them.

Brent looked after him in amazement. "He meant that. He was perfectly sincere."

"I know. He haves haved his mind changed. He believes what haves been forced upon him, but he believes it honestly. It bees sad. He beed most vigorous and active Seepy I have knowed since Alex."

Stephen frowned. "It bees hard to explain. But most of rebels against Stasis come from old families holding old beliefs. Many, like me, be Christians, and some be Seepies. I do not know myself all their beliefs, but they belong to schism of Mark."

Brent contemplated this statement for a moment, and then burst into a loud guffaw. "By Hobson and Jobson, this is sweet! Schism of Mark, Mark schism, Marxism. Seepy, C. P., Communist Party. And right in there fighting shoulder to shoulder with the Christians!" His face became graver. "And let's remember one thing, Stephen. They can change the mind of an individual. But when it comes to thousands, and tens of thousands—it may be their own minds that'll change."

"Amen," said Stephen. It was the only time Brent ever heard him utter a characteristically Christian phrase.

The rabbitly little State linguist received Brent effusively. "Ah, thank Cosmos!" he gasped. "Travelers be driving me mad! Such gibberish you have never heard! Such irregularities! Frightful! It bees shocking! You be Slanduch?"

"I be. I have speaked several languages all my life. I can even speak pre-Zinsmeister German." And he began to recite *Die Lorelei*. "*Die Luft ist kühl und es dunkelt, und ruhig fließt der Rhein—*"

"Terrible! *Ist!* Such vile irregularity! And articles! But come, young man. We'll see what you can do with these temporal barbarians!"

There were three travelers in the room Brent entered, with the shocked linguist and two rodded Stappers in attendance. One of the three was the woman he had noticed in that first cataclysmic instant of arrival, a strapping Amazonic blonde who looked as though she could break any two unarmed Stappers with her bare fingers. Another was a neat little man with a curly and minute forked beard and restless hands. The third—

The third was hell to describe. They were all dressed now in the conventional robes of the Stasis, but even in these familiar garments he was clearly not quite human. If man is a featherless biped, then this was a man; but men do not usually have greenish skin with vestigial scales and a trace of a gill-opening behind each ear.

"Ask each of them three things," the linguist instructed Brent. "When he comes from, what his name bees, and what be his intentions."

Brent picked Tiny Beard as the easiest-looking start. "O. K. You!" He pointed, and the man stepped forward. "What part of time do you come from?"

"A pox o' thee, sirrah, and the goodyears take thee! An thou wouldst but hearken to me, thou might'st learn all."

The State linguist moaned. "You hear, young man? How can one interpret such jargon?"

Brent smiled. "It bees O. K. This bees simply English as it beed speaked thousand years ago. This man must have beed aiming at earlier time and prepared himself. . . . Thy pardon, sir. These kerns deem all speech barbaric save that which their own conceit hath evolved. Bear with me, and all will be well."

"Spoken like a true knight!" the traveler exclaimed. "Forgive my rash words, sir. Surely my good daemon hath led thee hither. Thou wouldst know—"

"Whence comest thou?"

"From many years hence. Thousands upon thousands of summers have yet to run their course ere I—"

"Forgive me, sir; but of that much we are aware. Let us be precise."

"When then, marry, sir, 'tis from the fifth century."

Brent frowned. But to attempt to understand the gentleman's system of dating would take too much time at the moment. "And thy name, sir?"

"Kruj, sir. Or an thou wouldst be formal and courtly, Kruj Krujil Krujilar. But let Kruj suffice thee."

"And what most concerneth these gentlemen here is the matter of thine intentions. What are thy projects in this our earlier world?"

"My projects?" Kruj coughed. "Sir, in thee I behold a man of feeling, of sensibility, a man to whom one may speak one's mind. Many projects have I in good sooth, most carefully projected for me by the Zhurmandril. Much must I study in these realms of the great Elizabeth—though 'sblood! I know not how they seem so different from my conceits! But one thing above all else do I covet. I would to the Mermaid Tavern."

Brent grinned. "I fear me, sir, that we must talk at greater length. Much hast thou mistaken and much must I make clear to thee. But first I must talk with these others."

Kruj retired, frowning and plucking at his shred of beard. Brent beckoned forward the woman. She strode forth so vigorously that both Stappers bared their rods.

"Madam," Brent ventured tentatively, "what part of time do you come from?"

"Evybuy taws so fuy," she growled. "Bu I unnasta. Wy cachoo unnasta me?"

Brent laughed. "Is that all that's the trouble? You don't mind if I go on talking like this, do you?"

"Naw. You taw howeh you wanna, slonsoo donna like I dih taw stray."

Fascinating, Brent thought. All final consonants lost, and many others. Vowels corrupted along lines indicated in twentieth-century colloquial speech. Consonants sometimes restored in liaison as in French.

"What time do you come from, then?"

"Twenny-ni twenny-fie. N were am I now?"

"Twenty-four seventy-three. And your name, madam?"

"Mimi."

Brent had an incongruous vision of this giantess dying operatically in a Paris garret. "So. And your intentions here?"

"Ai gonno intenchuns. Juh wanna see wha go."

"You will, madam, I assure you. And now—" He beckoned to the green-skinned biped, who advanced with a curious lurching motion like a deep-sea diver.

"And you, sir. When do you come from?"

"Ya studier langue earthly. Vyerit todo langue isos. Ou comprendo wie govorit peöple."

Brent was on the ropes and groggy. The fa-

miliarity of some of the words made the entire speech even more incomprehensible. "Says which?" he gasped.

The green man exploded. "Ou existier nada but dolts, cochons, duraki v this terre? Nikovo parla langue earthly? Potztausend Sapperment en la leche de tu madre and I do mean you!"

Brent reeled. But even reeling he saw the disapproving frown of the State linguist and the itching fingers of the Stappers. He faced the green man calmly and said with utmost courtesy, "'Twas brillig and the slithy toves did gyre and gimble over the rivering waters of the hither-andthithering waters of pigeons on the grass alas. Thank you, sir." He turned to the linguist. "He says he won't talk."

Brent wrote in the never-to-be-read journal: *It was Martha again who solved my green man for me. She pointed out that he was patently extraterrestrial. (Apparently Nakamura's Law of Spacial Acceleration is as false as Charnwood's Law of Temporal Metabolism.) The vestigial scales and gills might well indicate Venus as his origin. He must come from some far distant future when the earth is overrun by inhabitants of other planets and terrestrial culture is all but lost. He had prepared himself for time travel by studying the speech of earth—langue earthly—reconstructed from some larger equivalent of the Rosetta Stone, but made the mistake of thinking that there was only one earthly speech, just as we tend imaginatively to think of Martian or Venusian as a single language. As a result, he's talking all earthly tongues at once. Martha sees a marked advantage in this, even more than in Mimi's corrupt dialect—*

"Thou, sir," said Brent to Kruj on his next visit, "art a linguist. Thou knowest speech and his nature. To wit, I would wager that thou couldst with little labor understand this woman here. One who hath so mastered our language in his greatest glory—"

The little man smirked. "I thank thee, sir. In sooth since thou didst speak with her yestereven I have already made some attempts at converse with her."

Mimi joined in. "He taws fuy, bu skina cue."

"Very well then. I want you both, and thee in particular, Kruj, to hearken to this green-skinned varlet here. Study his speech, sir, and learn what thou may'st."

"Wy?" Mimi demanded belligerently.

"The wench speaks sooth. Wherefore should we so?"

"You'll find out. Now let me at him."

It was slow, hard work, especially with the linguist and the Stappers ever on guard. It



meant rapid analysis of the possible origin of every word used by the Venusian, and a laborious painstaking attempt to find at random words that he would understand. But in the course of a week both Brent and the astonishingly adaptable Kruj had learned enough of this polyglot *langue earthly* to hold an intelligible conversation. Mimi was hopelessly lost, but Kruj occasionally explained matters to her in her own corrupt speech, which he had mastered by now as completely as Elizabethan.

It had been Stephen's idea that any project for the liberation of the time travelers must wait until more was learned of their nature. "You be man of good will, John. We trust you. You and mans like you can save us. But imagine that some travelers come from worlds far badder even than ours. Suppose that they come seeking only power for themselves? Suppose that they

come from civilization of cruelty and terror and be even more evil than Stappers?"

It was a wise point, and it was Martha who saw the solution in the Venusian's amazing tongue. In that *mélange* of languages, Brent could talk in front of the linguist and the Stappers with complete safety. Kruj and the Venusian, who must have astonishing linguistic ability to master the speech of another planet even so perversely, could discuss matters with the other travelers, and could tell him anything he needed to know before all the listening guards of the State.

All this conversation was, of course, theoretically guided by the linguist. He gave questions to Brent and received plausible answers, never dreaming that his questions had not been asked.

As far as his own three went, Brent was satisfied as to the value of their liberation. Mimi was not bright, but she seemed to mean well and

claimed to have been a notable warrior in her own matriarchal society. It was her feats in battle and exploration that had caused her to be chosen for time travel. She should be in some respects a useful ally.

Kruj was indifferent to the sorry state of the world until Brent mentioned the tasteless and servile condition of the arts. Then he was all afire to overthrow the Stasis and bring about a new renaissance. (Kruj, Brent learned, had been heading for the past to collect material for an historical epic on Elizabethan England, a fragment of prehistoric civilization that had always fascinated him.)

Of the three, Nikobat, the Venusian, seemed the soundest and most promising. To him, terrestrial civilization was a closed book, but a beautiful one. In the life and struggles of man he found something deep and moving. The aim of Nikobat in his own world had been to raise his transplanted Venusian civilization to the levels, spiritual and scientific, that had once been attained by earthly man, and it was to find the seed of inspiration to accomplish this that he had traveled back. Man degenerate, man self-complacent, man smug, shocked him bitterly, and he swore to exert his best efforts in the rousing.

Brent was feeling not displeased with himself as he left his group after a highly successful session. Kruj was accomplishing much among the other travelers and would have a nearly full report for him tomorrow. And once that report had been made, they could attempt Martha's extraordinary scheme of rescue. He would not have believed it ordinarily possible; but both he and Stephen were coming to put more and more trust in the suggestions of the once scatter-brained Martha. Stephen's own reports were more than favorable. The Underground was boring beautifully from within. The people of the State were becoming more and more restless and doubting. Slowly these cattle were resuming the forms of men.

Brent was whistling happily as he entered the apartment and called out a cheery "Hi!" to his friends. But they were not there. There was no one in the room but a white-clad Stapper, who smiled wolfishly as he rose from a chair and asked politely, "You be time traveler, be you not?"

This was the most impressive Stapper that Brent had yet seen—impressive even aside from the startling nature of his introductory remark. The others, even the one he had kicked in the face, or the one who killed Alex, Brent had thought of simply as so many Stappers. This one was clearly an individual. His skin was exceptionally dark and smooth and hairless, and two eyes so black that they seemed all pupil glowed out of his face and dominated the room.

Brent tried to seem casual. "Nonsense. I be Slanduch envoy from Germany, staying here with friends and doing linguistic service for State. Here bees my identification."

The Stapper hardly glanced at it. "I know all about your 'linguistic services,' John Brent. And I know about machine finded in deserted warehouse. It beed only machine not broken by Barrier. Therefore it comed not from Future, but from Past."

"So? We have travelers from both directions? Poor devil will never be able to get back to own time then." He wondered if this Stapper were corruptible; he could do with a drink of bond.

"Yes, he bees losed here in this time like others. And he foolishly works with them to overthrow Stasis."

"Sad story. But how does it concern me? My papers be in order. Surely you can see that I be what I claim?"

The Stapper's eyes fixed him sharply. "You be clever, John Brent. You doubtless traveled naked and clothed yourself as citizen of now to escape suspicion. That bees smartest way. How you getted papers I do not know. But communication with German Slanduch cans disprove your story. You be losed, Brent, unless you be sensible."

"Sensible? What the hell do you mean by that?"

The Stapper smiled slowly. "Article," he drawled.

"I be sorry. But that proves nothing. You know how difficult it bees for us Slanduch to keep our speech entirely regular."

"I know." Suddenly a broad grin spread across the Stapper's face and humanized it. "I have finded this Farthing speech hellishly difficult myself."

"You mean you, too, be Slanduch?"

The Stapper shook his head. "I, too, Brent, be traveler."

Brent was not falling for any such trap. "Ridiculous! How canned traveler be Stapper?"

"How canned traveler be Slanduch envoy? I, too, traveled naked, and man whose clothes and identification I stealed beed Stapper. I have finded his identity most useful."

"I don't believe you."

"You be stubborn, Brent. How to prove—" He gestured at his face. "Look at my skin. In my century facial hair haves disappeared; we have breded away from it. Where in this time could you find skin like that?"

"A sport. Freak of chromosomes."

The black eyes grew even larger and more glowing. "Brent, you must believe me. This bees no trap for you. I need you. You and I, we can do great things. But how to convince you"—he

snapped his fingers. "I know!" He was still for a moment. The vast eyes remained opened but somehow veiled, as though secret calculations were going on behind them. His body shivered. For a moment of strange delusion Brent thought he could see the chair through the Stapper's body. Then it was real and solid again.

The Stapper's eyes resumed their light, and he looked about the room expectantly for a moment. "Delay," he muttered disappointedly. "But no matter. In a moment—"

"What bees this?"

"My name," said the Stapper, with the patience of a professor addressing a retarded class, "bees Bokor. I come from tenth century after consummation of terrestrial unity, which bees, I believe, forty-third reckoning from date of birth of Christian god. I have traveled, not with machine, but solely by use of Vunmurd formula, and, therefore, I alone of all travelers stranded here can still move. Hysteresis of Barrier arrests me, but can not destroy my formula as it shatters machines."

"Pretty story."

"I have sended myself back to Barrier again by formula, but trip from Barrier to now seems longer for me this time. I—" He broke off as the door opened. "Ah," he said. "Here I be!"

The Stapper in the doorway fixed Brent with his glowing black eyes and said, "Now do you believe that I be traveler?"

Brent gawped from one identical man to the other. The one in the doorway went on. "I need you."

"It isn't possible. It's a gag. You're twin Stappers, and you're trying to—"

Bokor in the chair said, "Do I have to do it again?"

Bokor-Sub-One in the doorway said, "I have hitted Barrier twice. Therefore I exist twice in that one point of time. Therefore each of those two continues into present."

Brent said, "You may both be Stappers. You may turn out to be a whole damned regiment of identical multiple births. I don't give a damn; I want some bond. How about you boys?"

The two Bokors downed their drinks and frowned. "Weak," they said.

Brent shook his head feebly. "All right. We'll skip that. Now what the sweet hell do you need me for?"

Bokor closed his eyes and seemed to doze. Bokor-Sub-One said, "You have plans to liberate travelers and overthrow Stasis. As Stapper I have learned much. I worked on changing mind of one of your Underground friends."

"And you want to throw your weight in with us? Good, we can use a Stapper. Or two. But won't the Chief of Stappers be bothered when he

finds he has two copies of one man?"

"He will never need to see more than one. Yes, I want to help you—up to a point. We will free travelers. But you be innocent, Brent. We will not overthrow Stasis. We will maintain it—as ours."

Brent frowned. "I'm not sure I get you. And I don't think I like it if I do."

"Do not be fool, Brent. We have opportunity never before gived to man, we travelers. We come into world where already exists complete and absolute State control, but used stupidly and to no end. Among us all we have great knowledge and power. We be seed sowed upon fallow ground. We can spring up and engulf all about us." The eyes glowed with black intensity. "We take this Stasis and mold it to our own wishes. These dolts who now be slaves of Cosmos will be slaves of us. Stapper, whose identity I have, bees third in succession to Chief of Stappers. Chief and other two will be killed accidentally in revolt of travelers. With power of all Stappers behind me, I make you Head of State. Between us we control this State absolutely."

"Nuts," Brent snorted. "The State's got too damned much control already. What this world needs is a return to human freedom and striving."

"Innocent," Bokor-Sub-One repeated scornfully. "Who gives damn what world needs? Only needs which concern man be his own, and his strongest need bees always for power. Here it bees gived us. Other States be stupid and self-complacent like this. We know secrets of many weapons, we travelers. We turn our useless scholastic laboratories over to their production. Then we attack other States and subject them to us as vassals. And then the world itself bees ours, and all its riches. Alexander, Caesar, Napoleon, Hitler, Gospodinov, Tirazhul—never in its past or future haves world knowed nor will it know conquerors like us."

"You can go to hell," said Brent lightly but firmly. "All two of you."

"Do not be too clever, my friend. Remember that I be Stapper and can—"

"You be two Stappers, which may turn out to be a little awkward. But you could be a regiment of Stappers, and I still wouldn't play ball. Your plan stinks, Bokor, and you know what you can do with it."

Bokor-Sub-One took the idiom literally. "Indeed I do know, Brent. It willed have beed easier with your aid, but even without you it will succeed." He drew out his rod and contemplated it reflectively. "No," he murmured, "there bees no point to taking you in and changing your mind. You be harmless to me, and your liberation of travelers will be useful."

The original Bokor opened his eyes. "We will

meet again, Brent. And you will see what one man with daring mind can accomplish in this world." Bokor and Bokor-Sub-One walked to the door and turned. "And for bond," they spoke in unison, in parody of the conventional Stapper's phrase, "State thanks you."

Brent stood alone in the room, but the black-eyed domination of the two Bokors lingered about him. The plan was so damned plausible, so likely to succeed if put into operation. Man has always dreamed of power. But damn it, man has always dreamed of love, too, and of the rights of his fellow man. The only power worthy of man is the power of all mankind struggling together toward a goal of unobtainable perfection.

And what could Bokor do against Kruj and Mimi and Nikobat and the dozens of others that Kruj reported sympathetic?

Nevertheless there had been a certainty in those vast glowing eyes that the duple Bokor knew just what he could do.

The release of the travelers was a fabulous episode. Stephen had frowned and Brent had laughed when Martha said simply, "Only person who has power to release them bees Head of State by will of Cosmos. Very well. We will persuade him to do so." But she insisted, and she had been so uncannily right ever since the explosion of the second Barrier that at last, when Kruj had made his final report, Brent accompanied her on what he was certain was the damndest fool errand he'd got himself into yet.

Kruj's report was encouraging. There were two, perhaps three among the travelers who had Bokorian ideas of taking over the State for their own purposes. But these were far outweighed by the dozens who saw the tremendous possibilities of a reawakening of mankind. The liberation was proved a desirable thing; but why should the Head of State so readily loose these disrupters upon his Stasis?

Getting to see the Head of State took the best part of a day. There were countless minor officials to be interviewed, all of them guarded by Stappers who looked upon the supposed Slan-duch envoy with highly suspicious eyes. But one by one, with miraculous consistency, these officials beamed upon Brent's errand and sent him on with the blessing of Cosmos.

"You wouldn't like to pinch me?" he murmured to Martha after the fifth such success. "This works too easy. It can't be true."

Martha looked at him blankly and said, "I don't understand it. But what be we doing here? What be we going to say?"

Brent jumped. "Hey! Look, madam. This was all your idea to start with. You were going to talk the Head of State into— And now you say, 'What be we going to say?' If you don't—"

But a Stapper was already approaching to conduct them to the next office, and Brent fell silent.

It was in the anteroom of the Head of State that they met Bokor. Just one of him this time. He smiled confidentially at Brent and said, "Shocking accident today. Stapper beed killed in fight with prisoner who beed to have his mind changed. Odd thing—Stapper beed second in succession to Chief of Stappers."

"You're doing all right," said Brent.

"I be curious to see what you plan here. How do you hope to achieve this liberation? I talked with Head of State yesterday and he bees strongly opposed."

"Brother," said Brent sincerely, "I wish to Cosmos I knew."

In a moment Bokor ushered them into the sanctum sanctorum of the Head of State. This great dignitary was at first glance a fine figure of a man, tall and well built and noble. It was only on second glance that you noticed the weak lips and the horribly empty eyes. The stern and hawk-nosed Chief of Stappers stood beside him.

"Well!" the latter snapped. "Speak your piece!"

Brent faltered and glanced at Martha. She looked as vacant and helpless as ever she had before the Barrier. He could only fumble on and pray that her unrevealed scheme would materialize.

"As you know, sir," he began, "I, as interpreter, have beed in very close contact with travelers. Having in my mind good of Cosmos and wishing to see it as rich and fully developed as possible, it seems to me that much may be accomplished by releasing travelers so that they may communicate with people." He gulped and swore at himself for venturing such an idiotic request.

The empty eyes of the Head of State lit up for a moment. "Excellent idea," he boomed in a dulcet voice. "You have permission of State and Cosmos. Chief, I give orders that all travelers be released."

Brent heard Bokor's incredulous gasp behind him. The Chief of Stappers muttered "Cosmos!" fervently. The Head of State looked around him for approval and then reverted to formal vacancy.

"I thank State," Brent managed to say, "for this courageous move."

"What bees courageous?" the Head demanded. His eyes shifted about nervously. "What have I doed? What have I sayed?"

The Chief of Stappers bowed. "You have proclaimed freedom of travelers. May I, too, congratulate you on wisdom of action?" He turned to Bokor. "Go and give necessary orders."

Brent saw the dazed faces of Bokor and Martha and wondered if his own looked quite so ridiculously incredulous. That the Head of State and the Chief of Stappers should sanction a policy

that any dolt could see must inevitably be fatal to the Stasis of Cosmos— It was mad. It was a dream. But it was certainly a damned agreeable one.

Martha did not say a word till they were outside on the moving sidewalk again. Then she asked, "What happened? Why in Cosmos' name does he consent?"

"Madam, you have me there. But you should know. It was all your idea."

Understanding came back to her face. "Of course. It bees time now that you know all about me. But wait till we be back in apartment. Stephen haves right to know this, too. And Martha," she added.

That oral postscript was too much for Brent. When you begin talking of yourself as a third party—

"Come on home, madam," he said. "You'll feel better."

They had left Bokor behind them in the sanctum, and they met Bokor outside the building. That did not worry Brent, but he was admittedly perturbed when he passed a small group of people just off the sidewalk and noticed that its core was a third Bokor. He pulled Martha off the moving path and drew near the group.

Bokor was not being a Stapper this time. He was in ordinary iridescent robes. "I tell you I know," he was insisting vigorously. "I am . . . I be Slanduch from State of South America, and I can tell you deviltry they be practicing there. Armament factories twice size of laboratories of Cosmos. Bees this for nothing? They plan to destroy us; I know."

A Stapper shoved his way past Brent. "Here now!" he growled. "What bees going on here?"

Bokor hesitated. "Nothing, sir. I was only—" "Was, huh?"

"Pardon, sir. *Beed*. I be Slanduch, you see, and—"

One of the men in the crowd interrupted. "He beed telling us what all State needs to know—plans of State of South America to invade and destroy us."

"Hm-m-m!" the Stapper ejaculated. "You be right, man. That sounds like something we all need to know. Go on, you."

Bokor resumed his rumor mongering, and the Stapper lent it official endorsement by his listening silence. Brent moved to get a glimpse of the Stapper's face. His guess was right. It was another Bokor.

This significant byplay had delayed them enough so that Brent's three travelers had reached the apartment before them. When they arrived, Stephen was deep in a philosophical discussion with the Venusian of the tragic nobility

of human nature, while Kruj and Mimi were experimenting with bond. Their respective civilizations could not have been markedly alcoholic; Kruj had reached the stage of sweeping and impassioned gestures, while Mimi beamed at him and interposed an occasional irrelevant giggle.

All three had discarded the standardized robes of the Stasis and resumed, in this friendly privacy, the clothes in which they had arrived—Kruj a curiously simplified and perverted version of the ruffled court costume of the Elizabethan era he had hoped to reach, Mimi, the startling armor of an unfamiliar metal which was her uniform as Amazon warrior, and Nikobat a simple bronze-colored loincloth against which his green skin assumed a certain strange beauty.

Brent introduced Martha's guests to their hostess and went on, "Now for a staff meeting of G. H. Q. We've got to lay our plans carefully, because I warn you we're up against some stiff opposition. There's one other traveler who—"

"One moment," said Martha's voice. "Shouldn't you introduce me, too?"

"I beg your pardon, madam. I just finished that task of courtesy. And now—"

"I be sorry," her voice went on. "You still do not understand. You introduced Martha, yes; but not me."

Stephen turned to the travelers. "I must apologize for my sister. She haves goed through queer experiences of late. She traveled with our friend John and meeted herself in her earlier life. I fear that shock has temporarily—and temporarily—unbalanced her."

"Can none of you understand so simple thing?" the woman's voice pleaded. "I be simply using Martha's voice as instrument of communication. I can just as easily—"

"'Steeth!" Kruj exclaimed. "'Tis eke as easy and mayhap more pleasant to borrow this traveler's voice from mine explications."

"Or," Mimi added, "I cou taw li thih, but I do' like ih vey muh."

Stephen's eyes popped. "You mean that you be traveler without body?"

"Got it in one," Brent heard his own voice saying. "I can wander about any way I damned please. I picked the woman first because her nearly empty mind was easy to occupy, and I think I'll go on using her. Brent here's a little hard to keep under control."

Stephen nodded. "Then all good advice Martha haves beed giving us—"

"Bees mine, of course." The bodiless traveler was back in Martha now.

Brent gasped. "And now I see how you wangled the release of the travelers. You got us in by usurping the mind and speech of each of the minor officials we tackled, and then ousted the Head

of State and Chief of Stappers to make them give their consent."

Martha nodded. "Exactly."

"This is going to be damned useful. And where do you come from, sir? Or is it madam?"

"I come from future so far distant that even our Venusian friend here cannot conceive of it. And distinction between *sir* and *madam* bees then meaningless."

The dapper Krug glanced at the hulking Amazon beside him. "Twere pity," he murmured.

"And your intentions here, to go on with the State linguist's questionnaire?"

"My intentions? Listen, all of you. We cannot shape ends. Great patterns be shaped outside of us and beyond us. I beed historian in my time. I know patterns of mankind even down to minute details. And I know that Stephen here bees to lead people of this Age of Smugness out of their stupidity and back to humanity.

Stephen coughed embarrassedly. "I have no wish to lead. But for such cause man must do what he may."

"That bees ultimate end of this section of pattern. That bees fixed. All that we travelers can do bees to aid him as wisely as we can and to make the details of the pattern as pleasingly beautiful as may be. And that we will do."

Stephen must have been so absorbed in this speech that his hearing was dulled. The door opened without warning, and Bokor entered.

"Swounds!" Krug cried out. "A Stapper!"

Stephen smiled. "Why fear Stappers? You be legally liberated."

"Stapper, hell!" Brent snorted. "Well, Bokor? You still want to declare yourself in with your racket?"

Bokor's deep eyes swept the room. He smiled faintly. "I merely wished to show you something, Brent. So that you know what you be up against. I have finded two young scientists dissatisfied with scholastic routine of research for Cosmos. Now they work under my instructions, and they have maked for me—this." He held a bare rod in his hand.

"So it's a rod. So what next?"

"But it bees different rod, Brent. It does not paralyze. It destroys." The point of the rod wavered and covered in turn each individual in the room. "I want you to see what I can accomplish."

"You suvvabih!" Mimi yelled and started to rise. Krug restrained her.

"State thanks you, madam, for making up my mind. I will demonstrate on you. Watch this, Brent, and realize what chance you have against me." He pointed the rod firmly at Mimi.

"Do something!" Martha screamed.

It all happened at once, but Brent seemed to see it in slow motion even as he moved. Mimi

lunged forward furiously and recklessly. Krug dived for her feet and brought her to the floor out of the line of fire. At the same time Brent threw himself forward just as Bokor moved, so that the rod now pointed directly at Brent. He couldn't arrest his momentum. He was headed straight at Bokor's new instrument of death. And then the rod moved to Bokor's own head.

There was no noise, no flash. But Bokor's body was lying on the floor, and the head was nowhere.

"That beed hard," said Martha's voice. "I haved to stay in his mind long enough to actuate rod, but get out before death. Matter of fractions of seconds."

"Nice work, sir-madam," Brent grunted. He looked down at the headless corpse. "But that was only one of him."

Brent quoted in his journal: *Love, but a day, and the world has changed! A week, to be more exact, but the change is nonetheless sudden and impressive.*

Our nameless visitant from the future—they seem to need titles as little as sexes in that time—whom I have for convenience labeled Sirdam, has organized our plans about the central idea of interfering as little as possible—forcing the inhabitants of the Stasis to work out their own salvation. The travelers do not appear openly in this great change. We work through Stephen's associates.

The best single example to show the results we obtain is the episode of Professor Harrington, whose special department of so-called learning is the preservation of the Nakamura Law of Spacial Acceleration, which had so conclusively proved to the founders of the Stasis the impossibility of interplanetary travel.

This fell obviously within Nikobat's field. A young scientist affiliated with the Underground—a nephew, I have since learned, of Alex's—expounded the Nakamura doctrine as he had learned and re-proved it. It took the Venusian less than five minutes to put his finger on the basic flaw in the statement—the absolute omission, in all calculations, of any consideration of galactic drift. Once this correction was applied to the Nakamura formulas, they stood revealed as the pure nonsense which, indeed, Nikobat's very presence proved them.

It was not Nikobat but the young man who placed this evidence before Professor Harrington. The scene must have been classic. "I saw," the young man later told us—they are all trying desperately to unlearn Farthing-ized English—"his mouth fall open and gap spread across his face as wide as gap he suddenly finded in universe—the universe."

For the professor was not stupid. He was simply so conditioned from childhood to the acceptance of the Stasis of Cosmos that he had never questioned it. Besides, he had doubtless had friends whose minds were changed when they speculated too far.

Harrington's eyes lit up after the first shock. He grabbed pencil and paper and furiously checked through the revised equations again and again. He then called in a half dozen of his best students and set them to what was apparently a routine exercise—interpolating variations for galactic drift in the Nakamura formulas.

They ended as astonished as their instructor. The first one done stared incredulously at his results and gasped, "Nakamura beed wrong!"

One of them, horrified, destroyed his calculations, saying, "This bees against Stasis."

The professor smiled. "Not against, my boy. It bees beyond Cosmos."

That was typical. The sheep are ready to be roused, each in his individual way. Kruij has been training men to associate with the writers of the Stasis. The man's knowledge of literature of all periods, and especially of his beloved Elizabethan Age, is phenomenal and his memory something superhuman. And four writers out of five who hear his disciples discourse on the joys of creative language and quote from the Elizabethan dramatists and the King James Bible will never be content again to write Stasis propaganda for the sollies or the identically bound books of the State libraries.

I have myself been contributing a fair amount to the seduction of the world by teaching cooks. I was never in my own time acknowledged as better than a fair-to-middling nonprofessional, but here I might be Escoffier or Brillat-Savarin. We steal plants and animals from the scientific laboratories, and in our hands they become vegetables and meat; and many a man in the street, who doesn't give a damn if his science is false and his arts synthetic, has suddenly realized that he owes the State a grudge for feeding him on concentrates.

The focus of everything is Stephen. It's hard to analyze why. Each of us travelers has found among the Undergrounders someone far more able in his own special field, yet all of us, travelers and Undergrounders alike, unquestioningly acknowledge Stephen as our leader. It may be the sheer quiet kindness and goodness of his nature. It may be that he and Alex, in their organization of this undercover group of instinctive rebels, were the first openly to admit that the Stasis was inhuman and to do something about it. But from whatever cause, we all come to depend more and more on the calm reliability of Stephen.

Nikobat says—

Brent broke off as Kruij Kruijil Kruijilar staggered into the room. The little man was no longer dapper. His robes were tattered, and their iridescence was overlaid with the solid red of blood.

He panted his first words in his own tongue, then recovered himself. "We must act apace, John. Where is Stephen?"

"At Underground quarters, I think. But what's happened?"

"I was nearing the building where they do house us travelers when I beheld hundreds of people coming along the street. Some wore our robes, some wore Stappers'. And they all—" He shuddered. "They all had the same face—a brown hairless face with black eyes."

Brent was on his feet. "Bokor!" The man had multiplied himself into a regiment. One man who was hundreds—why not thousands? millions?—could indeed be such a conqueror as the world had never known. "What happened?"

"They entered the building. I knew that I could do nothing there, and came to find you and Stephen and the bodiless one. But as I came along the street, lo! on every corner there was yet another of that face, and always urging the people to maintain the Stasis and destroy the travelers. I was recognized. By good hap those who set upon me had no rods, but 'sbody! 'Twas a close thing that I escaped with my life."

Brent thought quickly. "Martha is with Stephen, so Sirdam is probably there, too. Go to him at once and warn him. I'm going to the travelers' building and see what's happened. Meet you at the headquarters as soon as I can."

Kruij hesitated. "Mimi—"

"I'll bring her with me if I can. Get going."

The streets were mad. Wild throngs jammed the moving roadways. Somewhere in the distance mountainous flames leaped up and their furious glitter gleamed back from the eyes of the mob.

And those were not the deeply glowing black eyes of multitudinous Bokors. These were the ordinary citizens of the Stasis, no longer cattle, or rather cattle stampeded and raging.

A voice blared seemingly out of the heavens. Brent recognized the public address system used for vital State messages. "Revolt of travelers haves spreaded to amphitheater of Cosmos. Flames lighted by travelers now attack sacred spot. People of Cosmos: Destroy travelers!"

"The Reichstag fire!" Brent muttered. "Technique doesn't change much—" If only he could avoid running into a Bokor. There was nothing to mark him superficially as a traveler. He pushed along with the mob, shouting as rabidly as any other. He could make no headway. He was borne along on these foaming human waves.

Then in front of him he saw three Bokors pushing against the mob. If they spied him—His hands groped along the wall. Just as a Bokor looked his way, he found what he was seeking—one of the spying niches of the Stappers. He slipped into the false wall in safety.

He peered out cautiously for a moment to escape. From the next door he saw a man emerge whom he knew by sight—a leading dramatist of the sollies, who had promised to be an eventual convert of Kruj's disciples. Three citizens of the mob halted him as he stepped forth.

"What bees your name?"

"Where be you going?"

"When do you come from?"

"Answer every man directly."

The solly writer hesitated. "I be going to amphitheater. Speaker have sayed—"

"When do you come from?"

"Why, from now."

"What bees your name?"

"John—"

"Ha!" the first citizen yelled. "Stappers have telled us to find this John. Tear him to pieces; he bees traveler."

"No, truly. I be no traveler; I be writer of sollies. I be of now."

One of the citizens chortled cruelly. "Tear him for his bad sollies!"

There was one long scream—

The smugness of the Stasis had been inhuman. Stephen and the travelers had sought to make the citizens human again in the noblest traditions of man's striving. But there was another manner of being human, and Bokor had found and roused it.

Fire breeds fire, literally as well as metaphorically. The dwelling of the travelers was ablaze when Brent reached it. A joyous mob cheered and gloated before it.

Brent started to push his way through, but a hand touched his arm and a familiar voice whispered, "Achtung! Ou vkhodit."

He interpreted the warning and let the Venusian draw him aside. Nikobat rapidly explained in Brent's own speech.

"The Stappers came and subdued the whole crowd with paralyzing rods. They took them away—God knows what they'll do with them. There's no one in there now; the fire's just a gesture." The red flames glittered on the green skin.

"But you— How did you—"

"My nerve centers don't react the same. I lay doggo and got away. Mimi escaped, too; her armor has deflecting power. I think she's gone to warn the Underground."

"Then come on."

"Don't stay too close to me," Nikobat warned. "They'll recognize me as a traveler; stay out of range of rods aimed at me. And here. I took these from a Stapper I strangled. This one is a paralyzing rod; the other's an annihilator."

The next half-hour was a nightmare—a montage of flames and blood and sweating bodies of hate. The Stasis of Stupidity was becoming a Stasis of Cruelty. For a moment Brent wondered if he could find where the Stappers had taken his machine. That Derringer model was the only machine unshattered—the only one that, though still helpless against the Barrier, could at least take him forward to what might be a better world—Kruj's esthetic paradise or even Mimi's matriarchy. But he thought of Stephen and Martha, and he pushed on toward the Underground headquarters.

Twice groups of citizens stopped him. They were unarmed; Bokor wisely kept weapons to himself, knowing that the fangs and claws of an enraged mob are enough. The first group Brent left paralyzed. The second time he confused his weapons. He had not meant to kill, but he could not regret it.

He did not confuse his weapons when he bagged a brace of Bokors. But what did the destruction of two matter? He fought his way on, finally catching up with Nikobat at their goal. As they met, the voice boomed once more from the air. "Important! New Chief of Stappers announces that offices of Chief of Stappers and Head of State be henceforth maked one. Under new control, travelers will be wiped out and Stasis preserved. Then on to South America for glory of Cosmos!"

Brent shuddered. "And we started out so beautifully on our renaissance!"

Nikobat shook his head. "But the bodiless traveler said that Stephen was to destroy the Stasis. This multiple villain cannot change what has happened."

"Can't he? We're taking no chances."

The headquarters of the Underground was inappositely in a loft. The situation helped. The trap entrance was unnoticeable from below and had gone unheeded by the mobs. Brent delivered the proper raps, and the trap slid open and dropped a ladder. Quickly he and the Venusian mounted.

The loft was a sick bay. A half-dozen wounded members of Stephen's group lay groaning on the floor. With them was Kruj. Somewhere the little man had evaded the direct line of an annihilator, but lost his hand. Blood was seeping out of his bandages, and Mimi, surprisingly feminine and un-Amazonic, held his unconscious head in her lap.

"You don't seem to need warning," Brent observed tersely.

Stephen shook his head sadly. "We be trapped here. Here we be safe for at littlest small while. If we go out—"

Brent handed him his rods. "You're the man we've got to save, Stephen. You know what Sirdam's said—it all depends on you. Use these to protect yourself, and we'll make a dash for it. If we can lose ourselves in the mob as ordinary citizens, there's a chance of getting away with it. "Or"—he turned to Martha-Sirdam—"have you any ideas?"

"Yes. But only as latest resort."

Nikobat was peering out the window. "It's the last resort now," he said. "There's a good fifty of those identical Stappers outside, and they're headed here. They act as though they know what this is."

Brent was looking at Stephen, and he saw a strange thing. Stephen's face was expressionless, but somewhere behind his eyes Brent seemed to sense a struggle. Stephen's body trembled with an effort of will, and then his eyes were clear again. "No," he said distinctly. "You do not need to control me. I understand. You be right. I will do as you say." And he lifted the annihilator rod.

Brent started forward, but his muscles did not respond to his commands. Force his will though he might, he stood still. It was the bodiless traveler who held him, he realized, held him motionless to watch Stephen place the rod to his temple.

"This bees goodest thing that I can do for mans," said Stephen simply. Then his headless corpse thumped on the floor.

Brent was released. He dashed forward, but vainly. There was nothing men could do for Stephen now. Brent let out a choking gasp of pain and sorrow.

Then the astonished cries of the Undergrounders recalled him from his friend's body. He looked about him. Where was Nikobat? Where were Kruj and Mimi?

A small inkling of the truth began to reach him. He hurried to the window and looked out.

There were no Bokors before the house. Only a few citizens staring dazedly at a wide space of emptiness.

At that moment the loud-speaker sounded. "Announcement," a shocked voice trembled. "Chief of Stappers haves just disappeared." And in a moment it added, "Guards report all travelers have vanished."

The citizens before the house were rubbing their eyes like men coming out of a nightmare.

"But don't you see, madam— No? Well, let me try again." Brent was not finding it easy to explain her brother's heroic death to an untenanted Martha. "Remember what your inhabitant told us? The Stasis was overthrown by Stephen."

"But Stephen bees dead."

"Exactly. So listen: All these travelers came from a future wherein Stephen had overthrown the Stasis. So that when Stephen destroyed himself, as Sirdam realized, he likewise destroyed that future. A world in which Stephen died unsuccessful is a world that cannot be entered by anyone from the other future. Their worlds vanished and they with them. It was the only way of abolishing the menace of the incredibly multiplied Bokor."

"Stephen bees dead. He cans not overthrow Stasis now."

"My dear madam— Hell, skip it. But the Stasis is damned nonetheless in this new world created by Stephen's death. I've been doing a little galping on my own. The people are convinced now that the many exemplars of Bokor were some kind of evil invader. They rebound easy, the hordes; they dread the memory of those men and they dread also the ideas of cruelty and conquest to which the Bokors had so nearly converted them.

"But one thing they can't rebound from is the doubts and the new awarenesses that we planted in their minds. And there's what's left of your movement to go on with. No, the Stasis is damned, even if they are going to erect yet another Barrier."

"Oh," Martha shuddered. "You willn't let them do that, will you?"

Brent grinned. "Madam, there's damned little letting I can do. They're going to, and that's that. Because, you see, all the travelers vanished."

"But why—"

Brent shrugged and gave up. "Join me in some bond?" It was clear enough. The point of time which the second Barrier blocked existed both in the past of the worlds of Nikobat and Sirdam, and in the past of this future they were now entering. But no travelers had come from this future. Therefore there must be a Barrier yet ahead of them.

Would the Stasis by then be dissolved into a normal human society? Would man have cast aside his purse-proud garment of smugness and become his struggling, striving, failing, ridiculous, noble self? And the travelers from this coming future—would they be Sirdams to counsel and guide man, or Bokors to corrupt and debase him?

Brent lifted his glass of bond. "To the moment after the next Barrier!" he said.

THE TWONKY

● The skilled—but very!—workman was a bit confused, and, in his daze, made something a little out of—time. Quite a little something, too. It looked like a standard radio, but unlike most of those complex gadgets, this one would wash the dishes!

By Lewis Padgett

Illustrated by Orban

The turnover at Mideastern Radio was so great that Mickey Lloyd couldn't keep track of his men. It wasn't only the draft; employees kept quitting and going elsewhere, at a higher salary. So when the big-headed little man in overalls wandered vaguely out of a storeroom, Lloyd took one look at the brown dungaree suit—company provided—and said mildly, "The whistle blew half an hour ago. Hop to work."

"Work-k-k?" The man seemed to have trouble with the word.

Drunk? Lloyd, in his capacity as foreman, couldn't permit that. He flipped away his cigarette, walked forward, and sniffed. No, it wasn't liquor. He peered at the badge on the man's overalls.

"Two-oh-four, m-mm. Are you new here?"

"New. Huh?" The man rubbed a rising bump on his forehead. He was an odd-looking little chap, bald as a vacuum tube, with a pinched, pallid face and tiny eyes that held dazed wonder.

"Come on, Joe. Wake up!" Lloyd was beginning to sound impatient. "You work here, don't you?"

"Joe," said the man thoughtfully. "Work. Yes, I work. I make them." His words ran together oddly, as though he had a cleft palate.

With another glance at the badge, Lloyd gripped Joe's arm and ran him through the assembly room. "Here's your place. Hop to it. Know what to do?"

The other drew his scrawny body erect. "I am—expert," he remarked. "Make them better than Ponthwank."

"O. K.," Lloyd said. "Make 'em, then." And he went away.

The man called Joe hesitated, nursing the bruise on his head. The overalls caught his attention, and he examined them wonderingly. Where—oh, yes. They had been hanging in the room from which he had first emerged. His own garments had, naturally, dissipated during the trip—what trip?

Amnesia, the thought. He had fallen from the

... the something ... when it slowed down and stopped. How odd this huge, machine-filled barn looked! It struck no chord of remembrance.

Amnesia, that was it. He was a worker. He made things. As for the unfamiliarity of his surroundings, that meant nothing. He was still dazed. The clouds would lift from his mind presently. They were beginning to do that already.

Work. Joe scuttled around the room, trying to goad his faulty memory. Men in overalls were doing things. Simple, obvious things. But how childish—how elemental! Perhaps this was a kindergarten.

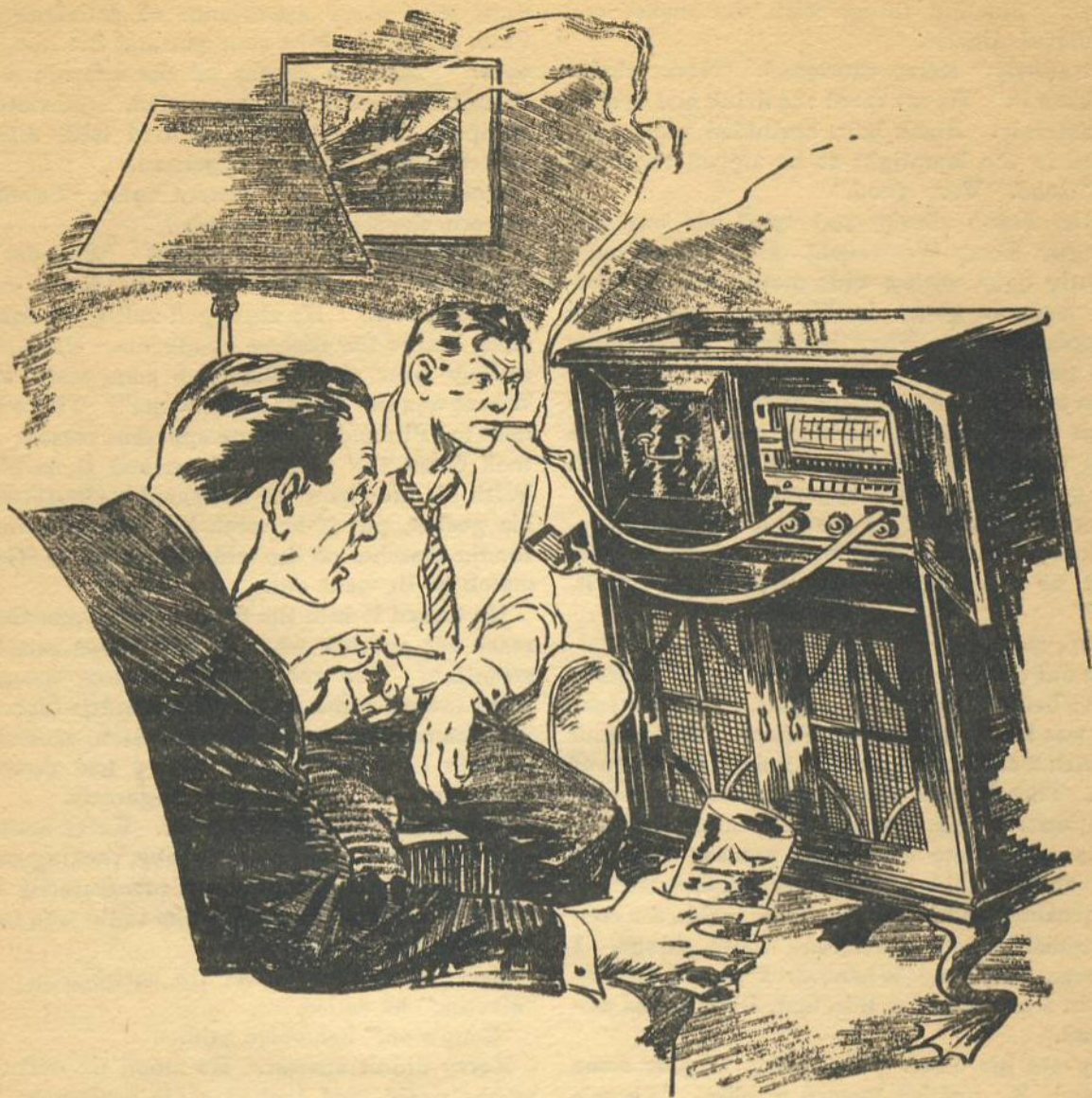
After a while Joe went out into a stock room and examined some finished models of combination radio-phonographs. So that was it. Awkward and clumsy, but it wasn't his place to say so. No. His job was to make Twonkies.

Twonkies? The name jolted his memory again. Of course he knew how to make Twonkies. He'd made them all his life—had been specially trained for the job. Now they were using a different model of Twonky, but what the hell! Child's play for a clever workman.

Joe went back into the shop and found a vacant bench. He began to build a Twonky. Occasionally he slipped off and stole the material he needed. Once, when he couldn't locate any tungsten, he hastily built a small gadget and made it.

His bench was in a distant corner, badly lighted, though it seemed quite bright to Joe's eyes. Nobody noticed the console that was swiftly growing to completion there. Joe worked very, very fast. He ignored the noon whistle, and, at quitting time, his task was finished. It could, perhaps, stand another coat of paint—it lacked the Shimmertone of a standard Twonky. But none of the others had Shimmertone. Joe sighed, crawled under the bench, looked in vain for a relaxopad, and went to sleep on the floor.

A few hours later he woke up. The factory was empty. Odd! Maybe the working hours had



changed. Maybe— Joe's mind felt funny. Sleep had cleared away the mists of amnesia, if such it had been, but he still felt dazed.

Muttering under his breath, he sent the Twonky into the stock room and compared it with the others. Superficially it was identical with a console radio-phonograph combination of the latest model. Following the pattern of the others, Joe had camouflaged and disguised the various organs and reactors.

He went back into the shop. Then the last of the mists cleared from his mind. Joe's shoulders jerked convulsively.

"Great Snell!" he gasped. "So that was it! I ran into a temporal snag!"

With a startled glance around, he fled to the storeroom from which he had first emerged. The overalls he took off and returned to their hook. After that, Joe went over to a corner, felt around in the air, nodded with satisfaction, and seated himself on nothing, three feet above the floor. Then Joe vanished.

AST-3K

"Time," said Kerry Westerfield, "is curved. Eventually it gets back to the same place where it started. That's duplication." He put his feet up on a conveniently outjutting rock of the chimney and stretched luxuriously. From the kitchen Martha made clinking noises with bottles and glasses.

"Yesterday at this time I had a Martini," Kerry said. "The time curve indicates that I should have another one now. Are you listening, angel?"

"I'm pouring," said the angel distantly.

"You get my point, then. Here's another. Time describes a spiral instead of a circle. If you call the first cycle *a*, the second one's a *plus 1*—see? Which means a double Martini tonight."

"I know where that would end," Martha remarked, coming into the spacious, oak-raftered living room. She was a small, dark-haired woman with a singularly pretty face and a figure to match. Her tiny gingham apron looked slightly absurd in combination with slacks and silk blouse. "And they don't make infinity-proof gin. Here's your

Martini." She did things with the shaker and manipulated glasses.

"Stir slowly," Kerry cautioned. "Never shake. Ah—that's it." He accepted the drink and eyed it appreciatively. Black hair, sprinkled with gray, gleamed in the lamplight as he sipped the Martini. "Good. Very good."

Martha drank slowly and eyed her husband. A nice guy, Kerry Westerfield. He was forty-odd, pleasantly ugly, with a wide mouth and an occasional sardonic gleam in his gray eyes, as he contemplated life. They had been married for twelve years, and liked it.

From outside, the late faint glow of sunset came through the windows, picking out the console cabinet that stood against the wall by the door. Kerry peered at it with appreciation.

"A pretty penny," he remarked. "Still—"

"What? Oh. The men had a tough time getting it up the stairs. Why don't you try it, Kerry?"

"Didn't you?"

"The old one was complicated enough," Martha said, in a baffled manner. "Gadgets. They confuse me. I was brought up on an Edison. You wound it up with a crank, and strange noises came out of a horn. That I could understand. But now—you push a button, and extraordinary things happen. Electric eyes, tone selections, records that get played on both sides, to the accompaniment of weird groanings and clickings from inside the console—probably you understand those things. I don't even want to. Whenever I play a Crosby record in a superdooper like that, Bing seems embarrassed."

Kerry ate his olive. "I'm going to play some Debussy." He nodded toward a table. "There's a new Crosby record for you. The latest."

Martha wriggled happily. "Can I, maybe, huh?"

"Uh-huh."

"But you'll have to show me how."

"Simple enough," said Kerry, beaming at the console. "Those babies are pretty good, you know. They do everything but think."

"I wish it'd wash the dishes," Martha remarked. She set down her glass, got up, and vanished into the kitchen.

Kerry snapped on a lamp nearby and went over to examine the new radio, Mideastern's latest model, with all the new improvements. It had been expensive—but what the hell? He could afford it. And the old one had been pretty well shot.

It was not, he saw, plugged in. Nor were there any wires in evidence—not even a ground. Something new, perhaps. Built-in antenna and ground. Kerry crouched down, looked for a socket, and plugged the cord into it.

That done, he opened the doors and eyed the

dials with every appearance of satisfaction. A beam of bluish light shot out and hit him in the eyes. From the depths of the console a faint, thoughtful clicking proceeded. Abruptly it stopped. Kerry blinked, fiddled with dials and switches, and bit at a fingernail.

The radio said, in a distant voice, "Psychology pattern checked and recorded."

"Eh?" Kerry twirled a dial. "Wonder what that was? Amateur station—no, they're off the air. Hm-m-m." He shrugged and went over to a chair beside the shelves of albums. His gaze ran swiftly over the titles and composers' names. Where was the "Swan of Tuolema"? There it was, next to "Finlandia," for no apparent reason. Kerry took down the album and opened it in his lap. With his free hand he extracted a cigarette from his pocket, put it between his lips, and fumbled for the matches on the table beside him. The first match he lit went out.

He tossed it into the fireplace and was about to reach for another when a faint noise caught his attention. The radio was walking across the room toward him. A whiplike tendril flicked out from somewhere, picked up a match, scratched it beneath the table top—as Kerry had done—and held the flame to the man's cigarette.

Automatic reflexes took over. Kerry sucked in his breath, and exploded in smoky, racking coughs. He bent double, gasping and momentarily blind.

When he could see again, the radio was back in its accustomed place.

Kerry caught his lower lip between his teeth. "Martha," he called.

"Soup's on," her voice said.

Kerry didn't answer. He stood up, went over to the radio, and looked at it hesitantly. The electric cord had been pulled out of its socket. Kerry gingerly replaced it.

He crouched to examine the console's legs. They looked like finely finished wood. His exploratory hand told him nothing. Wood—hard and brittle.

How in hell—

"Dinner!" Martha called.

Kerry threw his cigarette into the fireplace and slowly walked out of the room. His wife, setting a gravy boat in place, stared at him.

"How many Martinis did you have?"

"Just one," Kerry said in a vague way. "I must have dozed off for a minute. Yeah. I must have."

"Well, fall to," Martha commanded. "This is the last chance you'll have to make a pig of yourself on my dumplings, for a week, anyway."

Kerry absently felt for his wallet, took out an envelope, and tossed it toward his wife. "Here's your ticket, angel. Don't lose it."

"Oh? I rate a compartment!" Martha thrust the pasteboard back into its envelope and gurgled happily. "You're a pal. Sure you can get along without me?"

"Huh? Hm-m-m—I think so." Kerry salted his avocado. He shook himself and seemed to come out of a slight daze. "Sure, I'll be all right. You trot off to Denver and help Carol have her baby. It's all in the family."

"We-ell, my only sister—" Martha grinned. "You know how she and Bill are. Quite nuts. They'll need a steadying hand just now."

There was no reply. Kerry was brooding over a forkful of avocado. He muttered something about the Venerable Bede.

"What about him?"

"Lecture tomorrow. Every term we bog down on the Bede, for some strange reason. Ah, well."

"Got your lecture ready?"

Kerry nodded. "Sure. For eight years he had taught at the University, and he certainly should know the schedule by this time!

Later, over coffee and cigarettes, Martha glanced at her wrist watch. "Nearly train time. I'd better finish packing. The dishes—"

"I'll do 'em." Kerry wandered after his wife into the bedroom and made motions of futile helplessness. After a while, he carried the bags down to the car. Martha joined him, and they headed for the depot.

The train was on time. Half an hour after it had pulled out, Kerry drove the car back into the garage, let himself into the house and yawned mightily. He was tired. Well, the dishes, and then beer and a book in bed.

With a puzzled look at the radio, he entered the kitchen and did things with water and soap chips. The hall phone rang. Kerry wiped his hands on a dish towel and answered it.

It was Mike Fitzgerald, who taught psychology at the University.

"Hiya, Fitz."

"Hiya. Martha gone?"

"Yeah. I just drove her to the train."

"Feel like talking, then? I've got some pretty good Scotch. Why not run over and gab a while?"

"Like to," Kerry said, yawning again, "but I'm dead. Tomorrow's a big day. Rain check?"

"Sure. I just finished correcting papers, and felt the need of sharpening my mind. What's the matter?"

"Nothing. Wait a minute." Kerry put down the phone and looked over his shoulder, scowling. Noises were coming from the kitchen. What the hell!

He went along the hall and stopped in the doorway, motionless and staring. The radio was washing the dishes.

After a while he returned to the phone. Fitzgerald said, "Something?"

"My new radio," Kerry told him carefully. "It's washing the dishes."

Fitz didn't answer for a moment. His laugh was a bit hesitant. "Oh?"

"I'll call you back," Kerry said, and hung up. He stood motionless for a while, chewing his lip. Then he walked back to the kitchen and paused to watch.

The radio's back was toward him. Several limber tentacles were manipulating the dishes, expertly sousing them in hot, soapy water, scrubbing them with the little mop, dipping them into the rinse water, and then stacking them neatly in the metal rack. Those whip-lashes were the only sign of unusual activity. The legs were apparently solid.

"Hey!" Kerry said.

There was no response.

He sidled around till he could examine the radio more closely. The tentacles emerged from a slot under one of the dials. The electric cord was dangling. No juice, then. But what—

Kerry stepped back and fumbled out a cigarette. Instantly the radio turned, took a match from its container on the stove, and walked forward. Kerry blinked, studying the legs. They couldn't be wood. They were bending as the . . . the thing moved, elastic as rubber. The radio had a peculiar sidling motion unlike anything else on earth.

It lit Kerry's cigarette and went back to the sink, where it resumed the dishwashing.

Kerry phoned Fitzgerald again. "I wasn't kidding. I'm having hallucinations or something. That damned radio just lit a cigarette for me."

"Wait a minute—" Fitzgerald's voice sounded undecided. "This is a gag—eh?"

"No. And I don't think it's a hallucination, either. It's up your alley. Can you run over and test my knee-jerks?"

"All right," Fitz said. "Give me ten minutes. Have a drink ready."

He hung up, and Kerry, laying the phone back into its cradle, turned to see the radio walking out of the kitchen toward the living room. Its square, boxlike contour was subtly horrifying, like some bizarre sort of hobgoblin. Kerry shivered.

He followed the radio, to find it in its former place, motionless and impassive. He opened the doors, examining the turntable, the phonograph arm, and the other buttons and gadgets. There was nothing apparently unusual. Again he touched the legs. They were not wood, after all. Some plastic, which seemed quite hard. Or—maybe they were wood, after all. It was difficult to make certain, without damaging the finish. Kerry felt a natural reluctance to use a knife on his new console.

He tried the radio, getting local stations without trouble. The tone was good—unusually good, he thought. The phonograph—

He picked up Halvorsen's "Entrance of the

Boyards" at random and slipped it into place, closing the lid. No sound emerged. Investigation proved that the needle was moving rhythmically along the groove, but without audible result. Well?

Kerry removed the record as the doorbell rang. It was Fitzgerald, a gangling, saturnine man with a leathery, wrinkled face and a tousled mop of dull-gray hair. He extended a large, bony hand.

"Where's my drink?"

"Lo, Fitz. Come in the kitchen. I'll mix. Highball?"

"Highball."

"O. K." Kerry led the way. "Don't drink it just yet, though. I want to show you my new combination."

"The one that washes dishes?" Fitzgerald asked. "What else does it do?"

Kerry gave the other a glass. "It won't play records."

"Oh, well. A minor matter, if it'll do the housework. Let's take a look at it." Fitzgerald went into the living room, selected "Afternoon of a Faun," and approached the radio. "It isn't plugged in."

"That doesn't matter a bit," Kerry said wildly.

"Batteries?" Fitzgerald slipped the record in place and adjusted the switches. "Ten inch—there. Now we'll see." He beamed triumphantly at Kerry. "Well? It's playing now."

It was.

Kerry said, "Try that Halvorsen piece. Here." He handed the disk to Fitzgerald, who pushed the reject switch and watched the lever arm lift.

But this time the phonograph refused to play. It didn't like "Entrance of the Boyards."

"That's funny," Fitzgerald grunted. "Probably the trouble's with the record. Let's try another."

There was no trouble with "Daphnis and Chloe." But the radio silently rejected the composer's "Bolero."

Kerry sat down and pointed to a nearby chair. "That doesn't prove anything. Come over here and watch. Don't drink anything yet. You, uh, you feel perfectly normal?"

"Sure. Well?"

Kerry took out a cigarette. The console walked across the room, picking up a match book on the way, and politely held the flame. Then it went back to its place against the wall.

Fitzgerald didn't say anything. After a while he took a cigarette from his pocket and waited. Nothing happened.

"So?" Kerry asked.

"A robot. That's the only possible answer. Where in the name of Petrarch did you get it?"

"You don't seem much surprised."

"I am, though. But I've seen robots before—Westinghouse tried it, you know. Only this—"

Fitzgerald tapped his teeth with a nail. "Who made it?"

"How the devil should I know?" Kerry demanded. "The radio people, I suppose."

Fitzgerald narrowed his eyes. "Wait a minute. I don't quite understand—"

"There's nothing to understand. I bought this combination a few days ago. Turned in the old one. It was delivered this afternoon, and—" Kerry explained what had happened.

"You mean you didn't know it was a robot?"

"Exactly. I bought it as a radio. And . . . and . . . the damn thing seems almost alive to me."

"Nope." Fitzgerald shook his head, rose, and inspected the console carefully. "It's a new kind of robot. At least—" He hesitated. "What else is there to think? I suggest you get in touch with the Mideastern people tomorrow and check up."

"Let's open the cabinet and look inside," Kerry suggested.

Fitzgerald was willing, but the experiment proved impossible. The presumably wooden panels weren't screwed into place, and there was no apparent way of opening the console. Kerry found a screwdriver and applied it, gingerly at first, then with a sort of repressed fury. He could neither pry free a panel or even scratch the dark, smooth finish of the cabinet.

"Damn!" he said finally. "Well, your guess is as good as mine. It's a robot. Only I didn't know they could make 'em like this. And why in a radio?"

"Don't ask me," Fitzgerald shrugged. "Check up tomorrow. That's the first step. Naturally I'm pretty baffled. If a new sort of specialized robot has been invented, why put it in a console? And what makes those legs move? There aren't any casters."

"I've been wondering about that, too."

"When it moves, the legs look—rubbery. But they're not. They're hard as . . . as hardwood. Or plastic."

"I'm afraid of the thing," Kerry said.

"Want to stay at my place tonight?"

"N-no. No. I guess not. The—robot—can't hurt me."

"I don't think it wants to. It's been helping you, hasn't it?"

"Yeah," Kerry said, and went off to mix another drink.

The rest of the conversation was inconclusive. Fitzgerald, several hours later, went home rather worried. He wasn't as casual as he had pretended, for the sake of Kerry's nerves. The impingement of something so entirely unexpected on normal life was subtly frightening. And yet, as he had said, the robot didn't seem menacing—

Kerry went to bed, with a new detective mystery. The radio followed him into the bedroom

and gently took the book out of his hand. Kerry instinctively snatched for it.

"Hey!" he said. "What the devil—"

The radio went back into the living room. Kerry followed, in time to see the book replaced on the shelf. After a bit Kerry retreated, locking his door, and slept uneasily till dawn.

In dressing gown and slippers, he stumbled out to stare at the console. It was back in its former place, looking as though it had never moved. Kerry, rather white around the gills, made breakfast.

He was allowed only one cup of coffee. The radio appeared, reprovingly took the second cup from his hand, and emptied it into the sink.

That was quite enough for Kerry Westerfield. He found his hat and topcoat and almost ran out of the house. He had a horrid feeling that the radio might follow him, but it didn't, luckily for his sanity. He was beginning to be worried.

During the morning he found time to telephone Mideastern. The salesman knew nothing. It was a standard model combination—the latest. If it wasn't giving satisfaction, of course, he'd be glad to—

"It's O. K.," Kerry said. "But who made the thing? That's what I want to find out."

"One moment, sir." There was a delay. "It came from Mr. Lloyd's department. One of our foremen."

"Let me speak to him, please."

But Lloyd wasn't very helpful. After much thought, he remembered that the combination had been placed in the stock room without a serial number. It had been added later.

"But who *made* it?"

"I just don't know. I can find out for you, I guess. Suppose I ring you *back*."

"Don't forget," Kerry said, and went back to his class. The lecture on the Venerable Bede wasn't too successful.

At lunch he saw Fitzgerald, who seemed relieved when Kerry came over to his table. "Find out any more about your pet robot?" the psychology professor demanded.

No one else was within hearing. With a sigh Kerry sat down and lit a cigarette. "Not a thing. It's a pleasure to be able to do this myself." He drew smoke into his lungs. "I phoned the company."

"And?"

"They don't know anything. Except that it didn't have a serial number."

"That may be significant," Fitzgerald said.

Kerry told the other about the incidents of the book and the coffee, and Fitzgerald squinted thoughtfully at his milk. "I've given you some psych tests. Too much stimulation isn't good for you."

"A detective yarn!"

"Carrying it a bit to extremes, I'll admit. But I can understand *why* the robot acted that way—though I dunno how it managed it." He hesitated. "Without intelligence, that is."

"Intelligence?" Kerry licked his lips. "I'm not so sure that it's just a machine. And I'm not crazy."

"No, you're not. But you say the robot was in the front room. How could it tell what you were reading?"

"Short of X-ray vision and superfast scanning and assimilative powers, I can't imagine. Perhaps it doesn't want me to read anything."

"You've said something," Fitzgerald grunted. "Know much about theoretical—machines—of that type?"

"Robots?"

"Purely theoretical. Your brain's a colloid, you know. Compact, complicated—but slow. Suppose you work out a gadget with a multimillion radio-atom unit embedded in an insulating material—the result is a brain, Kerry. A brain with a tremendous number of units interacting at light-velocity speeds. A radio tube adjusts current flow when it's operating at forty million separate signals a second. And—theoretically—a radioatomic brain of the type I've mentioned could include perception, recognition, consideration, reaction and adjustment in a hundred-thousandth of a second."

"Theory."

"I've thought so. But I'd like to find out where your radio came from."

A page came over. "Telephone call for Mr. Westerfield."

Kerry excused himself and left. When he returned, there was a puzzled frown knitting his dark brows. Fitzgerald looked at him inquiringly.

"Guy named Lloyd, at the Mideastern plant. I was talking to him about the radio."

"Any luck?"

Kerry shook his head. "No. Well, not much. He didn't know who had built the thing."

"But it was built in the plant?"

"Yes. About two weeks ago—but there's no record of who worked on it. Lloyd seemed to think that was very, very funny. If a radio's built in the plant, they *know* who put it together."

"So?"

"So nothing. I asked him how to open the cabinet, and he said it was easy. Just unscrew the panel in back."

"There aren't any screws," Fitzgerald said.

"I know."

They looked at one another.

Fitzgerald said, "I'd give fifty bucks to find out whether that robot was really built only two weeks ago."

"Why?"

"Because a radioatomic brain would need train-

ing. Even in such matters as the lighting of a cigarette."

"It saw me light one."

"And followed the example. The dish-washing—hm-m-m. Induction, I suppose. If that gadget has been trained, it's a robot. If it hasn't—" Fitzgerald stopped.

Kerry blinked. "Yes?"

"I don't know what the devil it is. It bears the same relation to a robot that we bear to *eohippus*. One thing I do know, Kerry; it's very probably that no scientist today has the knowledge it would take to make a . . . a thing like that."

"You're arguing in circles," Kerry said. "It was made."

"Uh-huh. But how—when—and by whom? That's what's got me worried."

"Well, I've a class in five minutes. Why not come over tonight?"

"Can't. I'm lecturing at the Hall. I'll phone you after, though."

With a nod Kerry went out, trying to dismiss the matter from his mind. He succeeded pretty well. But dining alone in a restaurant that night, he began to feel a general unwillingness to go home. A hobgoblin was waiting for him.

"Brandy," he told the waiter. "Make it double."

Two hours later a taxi let Kerry out at his door. He was remarkably drunk. Things swam before his eyes. He walked unsteadily toward the porch, mounted the steps with exaggerated care, and let himself into the house.

He switched on a lamp.

The radio came forward to meet him. Tentacles, thin, but strong as metal, coiled gently around his body, holding him motionless. A pang of violent fear struck through Kerry. He struggled desperately and tried to yell, but his throat was dry.

From the radio panel a beam of yellow light shot out, blinding the man. It swung down, aimed at his chest. Abruptly a queer taste was perceptible under Kerry's tongue.

After a minute or so, the ray clicked out, the tentacles flashed back out of sight, and the console returned to its corner. Kerry staggered weakly to a chair and relaxed, gulping.

He was sober. Which was quite impossible. Fourteen brandies infiltrate a definite amount of alcohol into the system. One can't wave a magic wand and instantly reach a state of sobriety. Yet that was exactly what had happened.

The—robot—was trying to be helpful. Only Kerry would have preferred to remain drunk.

He got up gingerly and sidled past the radio to the bookshelf. One eye on the combination, he took down the detective novel he had tried to read on the preceding night. As he had expected, the

radio took it from his hand and replaced it on the shelf. Kerry, remembering Fitzgerald's words, glanced at his watch. Reaction time, four seconds.

He took down a Chaucer and waited, but the radio didn't stir. However, when Kerry found a history volume, it was gently removed from his fingers. Reaction time, six seconds.

Kerry located a history twice as thick.

Reaction time, ten seconds.

Uh-huh. So the robot did read the books. That meant X-ray vision and superswift reactions. Jumping Jehoshaphat!

Kerry tested more books, wondering what the criterion was. "Alice in Wonderland" was snatched from his hand; Millay's poems were not. He made a list, with two columns, for future reference.

The robot, then, was not merely a servant. It was a censor. But what was the standard of comparison?

After a while he remembered his lecture tomorrow, and thumbed through his notes. Several points needed verification. Rather hesitantly he located the necessary reference book—and the robot took it away from him.

"Wait a minute," Kerry said. "I need that." He tried to pull the volume out of the tentacle's grasp, without success. The console paid no attention. It calmly replaced the book on its shelf.

Kerry stood biting his lip. This was a bit too much. The damned robot was a monitor. He sidled toward the book, snatched it, and was out in the hall before the radio could move.

The thing was coming after him. He could hear the soft padding of its . . . its feet. Kerry scurried into the bedroom and locked the door. He waited, heart thumping, as the knob was tried gently.

A wire-thin cilia crept through the crack of the door and fumbled with the key. Kerry suddenly jumped forward and shoved the auxiliary bolt into position. But that didn't help, either. The robot's precision tools—the specialized antenna—slid it back; and then the console opened the door, walked into the room, and came toward Kerry.

He felt a touch of panic. With a little gasp he threw the book at the thing, and it caught it deftly. Apparently that was all that was wanted, for the radio turned and went out, rocking awkwardly on its rubbery legs, carrying the forbidden volume. Kerry cursed quietly.

The phone rang. It was Fitzgerald.

"Well? How'd you make out?"

"Have you got a copy of Cassen's 'Social Literature of the Ages?'"

"I don't think so—no. Why?"

"I'll get it in the University library tomorrow,

then." Kerry explained what had happened. Fitzgerald whistled softly.

"Interfering, is it? Hm-m-m. I wonder—"

"I'm afraid of the thing."

"I don't think it means you any harm. You say it sobered you up?"

"Yeah. With a light ray. That isn't very logical."

"It might be. The vibratory equivalent of thiamin chloride."

"Light?"

"There's vitamin content in sunlight, you know. That isn't the important point. It's censoring your reading—and apparently it reads the books, with superfast reactions. That gadget, whatever it is, isn't merely a robot."

"You're telling me," Kerry said grimly. "It's a Hitler."

Fitzgerald didn't laugh. Rather soberly, he suggested, "Suppose you spend the night at my place?"

"No," Kerry said, his voice stubborn. "No so-and-so radio's going to chase me out of my house. I'll take an ax to the thing first."

"We-ell—you know what you're doing, I suppose. Phone me if . . . if anything happens."

"O. K.," Kerry said, and hung up. He went into the living room and eyed the radio coldly. What the devil was it—and what was it trying to do? Certainly it wasn't merely a robot. Equally certainly, it wasn't alive, in the sense that a colloid brain is alive.

Lips thinned, he went over and fiddled with the dials and switches. A swing band's throbbing, erratic tempo came from the console. He tried the short-wave band—nothing unusual there. So?

So nothing. There was no answer.

After a while he went to bed.

At luncheon the next day he brought Cassen's "Social Literature" to show Fitzgerald.

"What about it?"

"Look here." Kerry flipped the pages and indicated a passage. "Does this mean anything to you?"

Fitzgerald read it. "Yeah. The point seems to be that individualism is necessary for the production of literature. Right?"

Kerry looked at him. "I don't know."

"Eh?"

"My mind goes funny."

Fitzgerald rumbled his gray hair, narrowing his eyes and watching the other man intently. "Come again. I don't quite—"

With angry patience, Kerry said, "This morning I went into the library and looked up this reference. I read it all right. But it didn't mean anything to me. Just words. Know how it is when you're fagged out and have been reading a lot? You'll run into a sentence with a lot of subjun-

ctive clauses, and it doesn't percolate. Well, it was like that."

"Read it now," Fitzgerald said quietly, thrusting the book across the table.

Kerry obeyed, looking up with a wry smile. "No good."

"Read it aloud. I'll go over it with you, step by step."

But that didn't help. Kerry seemed utterly unable to assimilate the sense of the passage.

"Semantic block, maybe," Fitzgerald said, scratching his ear. "Is this the first time it's happened?"

"Yes . . . no. I don't know."

"Got any classes this afternoon? Good. Let's run over to your place."

Kerry thrust away his plate. "All right. I'm not hungry. Whenever you're ready—"

Half an hour later they were looking at the radio. It seemed quite harmless. Fitzgerald wasted some time trying to pry a panel off, but finally gave it up as a bad job. He found pencil and paper, seated himself opposite Kerry, and began to ask questions.

At one point he paused. "You didn't mention that before."

"Forgot it, I guess."

Fitzgerald tapped his teeth with the pencil. "Hm-m-m. The first time the radio acted up—"

"It hit me in the eye with a blue light—"

"Not that. I mean—what it said."

Kerry blinked. "What it said?" He hesitated. "Psychology pattern checked and noted, or something like that. I thought I'd tuned in on some station and got part of a quiz program or something. You mean—"

"Were the words easy to understand? Good English?"

"No, now that I remember it," Kerry scowled. "They were slurred quite a lot. Vowels stressed."

"Uh-huh. Well, let's get on." They tried a word-association test.

Finally Fitzgerald leaned back, frowning. "I want to check this stuff with the last tests I gave you a few months ago. It looks funny to me—damned funny. I'd feel a lot better if I knew exactly what memory was. We've done considerable work on mnemonics—artificial memory. Still, it may not be that at all."

"Eh?"

"That—machine. Either it's got an artificial memory, has been highly trained, or else it's adjusted to a different *milieu* and culture. It has affected you—quite a lot."

Kerry licked dry lips. "How?"

"Implanted blocks in your mind. I haven't correlated them yet. When I do, we may be able to figure out some sort of answer. No, that thing isn't

a robot. It's a lot more than that."

Kerry took out a cigarette; the console walked across the room and lit it for him. The two men watched with a faint shrinking horror.

"You'd better stay with me tonight," Fitzgerald suggested.

"No," Kerry said. He shivered.

The next day Fitzgerald looked for Kerry at lunch, but the younger man did not appear. He telephoned the house, and Martha answered the call.

"Hello! When did you get back?"

"Hello, Fitz. About an hour ago. My sister went ahead and had her baby without me—so I came back." She stopped, and Fitzgerald was alarmed at her tone.

"Where's Kerry?"

"He's here. Can you come over, Fitz? I'm worried."

"What's the matter with him?"

"I . . . I don't know. Come right away."

"O. K.," Fitzgerald said, and hung up, biting his lips. He was worried. When, a short while later, he rang the Westerfield bell, he discovered that his nerves were badly out of control. But sight of Martha reassured him.

He followed her into the living room. Fitzgerald's glance went at once to the console, which was unchanged; and then to Kerry, seated motionless by a window. Kerry's face had a blank, dazed look. His pupils were dilated, and he seemed to recognize Fitzgerald only slowly.

"Hello, Fitz," he said.

"How do you feel?"

Martha broke in. "Fitz, what's wrong? Is he sick? Shall I call the doctor?"

Fitzgerald sat down. "Have you noticed anything funny about that radio?"

"No. Why?"

"Then listen." He told the whole story, watching incredulity struggle with reluctant belief on Martha's face. Presently she said, "I can't quite—"

"If Kerry takes out a cigarette, the thing will light it for him. Want to see how it works?"

"N-no. Yes. I suppose so." Martha's eyes were wide.

Fitzgerald gave Kerry a cigarette. The expected happened.

Martha didn't say a word. When the console had returned to its place, she shivered and went over to Kerry. He looked at her vaguely.

"He needs a doctor, Fitz."

"Yes." Fitzgerald didn't mention that a doctor might be quite useless.

"What is that thing?"

"It's more than a robot. And it's been readjusting Kerry. I told you what's happened. When I checked Kerry's psychology patterns, I found that

they'd altered. He's lost most of his initiative."

"Nobody on earth could have made that—"

Fitzgerald scowled. "I thought of that. It seems to be the product of a well-developed culture, quite different from ours. Martian, perhaps. It's such a specialized thing that it naturally fits into a complicated culture. But I *do not* understand why it looks exactly like a Mideastern console radio."

Martha touched Kerry's hand. "Camouflage?"

"But why? You were one of my best pupils in psych, Martha. Look at this logically. Imagine a civilization where a gadget like that has its place. Use inductive reasoning."

"I'm trying to. I can't think very well. Fitz, I'm worried about Kerry."

"I'm all right," Kerry said.

Fitzgerald put his fingertips together. "It isn't a radio so much as a monitor. In this other civilization, perhaps every man has one, or maybe only a few—the ones who need it. It keeps them in line."

"By destroying initiative?"

Fitzgerald made a helpless gesture. "I don't know! It worked that way in Kerry's case. In others—I don't know."

Martha stood up. "I don't think we should talk any more. Kerry needs a doctor. After that we can decide upon that." She pointed to the console.

Fitzgerald said, "It'd be rather a shame to wreck it, but—" His look was significant.

The console moved. It came out from its corner with a sidling, rocking gait and walked toward Fitzgerald. As he sprang up, the whiplike tentacles flashed out and seized him. A pale ray shone into the man's eyes.

Almost instantly it vanished; the tentacles withdrew, and the radio returned to its place. Fitzgerald stood motionless. Martha was on her feet, one hand at her mouth.

"Fitz!" Her voice shook.

He hesitated. "Yes? What's the matter?"

"Are you hurt? What did it do to you?"

Fitzgerald frowned a little. "Eh? Hurt? I don't—"

"The radio. What did it do?"

He looked toward the console. "Something wrong with it? Afraid I'm not much of a repair man, Martha."

"Fitz." She came forward and gripped his arm. "Listen to me." Quick words spilled from her mouth. The radio. Kerry. Their discussion—

Fitzgerald looked at her blankly, as though he didn't quite understand. "I guess I'm stupid today. I can't quite understand what you're talking about."

"The radio—you know! You said it changed

Kerry—" Martha paused, staring at the man.

Fitzgerald was definitely puzzled. Martha was acting strangely. Queer! He'd always considered her a pretty level-headed girl. But now she was talking nonsense. At least, he couldn't figure out the meaning of her words—there was no sense to them.

And why was she talking about the radio? Wasn't it satisfactory? Kerry had said it was a good buy, with a fine tone and the latest gadgets in it. Fitzgerald wondered, for a fleeting second, if Martha had gone crazy.

In any case, he was late for his class. He said so. Martha didn't try to stop him when he went out. She was pale as chalk.

Kerry took out a cigarette. The radio walked over and held a match.

"Kerry!"

"Yes, Martha?" His voice was dead.

She stared at the . . . the radio. Mars? Another world—another civilization? What was it? What did it want? *What was it trying to do?*

Martha let herself out of the house and went to the garage. When she returned, a small hatchet was gripped tightly in her hand.

Kerry watched. He saw Martha walk over to the radio and lift the hatchet. Then a beam of light shot out, and Martha vanished. A little dust floated up in the afternoon sunlight.

"Destruction of life-form threatening attack," the radio said, slurring the words together.

Kerry's brain turned over. He felt sick, dazed and horribly empty. Martha—

His mind—churned. Instinct and emotion fought with something that smothered them. Abruptly the dams crumbled, and the blocks were gone, the barriers down. Kerry cried out hoarsely, inarticulately, and sprang to his feet.

"Martha!" he yelled.

She was gone. Kerry looked around. Where—What had happened? He couldn't remember.

He sat down in the chair again, rubbing his forehead. His free hand brought up a cigarette, an automatic reaction that brought instant response.

The radio walked forward and held a lighted match ready.

Kerry made a choking, sick sound and flung himself out of the chair. He remembered now. He picked up the hatchet and sprang toward the console, teeth bared in a mirthless rictus.

Again the light beam flashed out.

Kerry vanished. The hatchet thudded onto the carpet.

The radio walked back to its place and stood motionless once more. A faint clicking proceeded from its radioatomic brain.

"Subject basically unsuitable," it said, after a moment. "Elimination has been necessary." *Click!* "Preparation for next subject completed."

Click.

"We'll take it," the boy said.

"You won't be making a mistake," smiled the rental agent. "It's quiet, isolated, and the price is quite reasonable."

"Not so very," the girl put in. "But it *is* just what we've been looking for."

The agent shrugged. "Of course an unfurnished place would run less. But—"

"We haven't been married long enough to get any furniture," the boy grinned. He put an arm around his wife. "Like it, hon?"

"Hm-m-m. Who lived here before?"

The agent scratched his cheek. "Let's see. Some people named Westerfield, I think. It was given to me for listing just about a week ago. Nice place. If I didn't own my own house, I'd jump at it myself."

"Nice radio," the boy said. "Late model, isn't it?" He went over to examine the console.

"Come along," the girl urged. "Let's look at the kitchen again."

"O. K., hon."

They went out of the room. From the hall came the sound of the agent's smooth voice, growing fainter. Warm afternoon sunlight slanted through the windows.

For a moment there was silence. Then—

Click!

THE END.



Bowling — or Biking



DEATH UNDER THE SEA

By Willy Ley

● The art of death from the air was described in a recent issue—the more efficient, though even blinder art of unseen death under the sea, takes the history of mine, torpedo and submarine back further than most realize.

Illustrated by Willy Ley

It is a tempting idea to speculate how naval warfare of today would look if Robert Fulton had not lived. For Robert Fulton may be held responsible for more than half of all modern naval weapons. This statement may sound a bit surprising to all those to whom Fulton's name is just the name of the inventor of the steamship, but it is nevertheless true.

Of course there can be no doubt that Robert Fulton's fame in our time is based mainly on the *Clermont*, the first American steamship which began to ply the Hudson between New York and Albany in 1807. Incidentally, the *Clermont* was not, as one can read occasionally, the very first steamboat ever built. Fulton himself had demonstrated an earlier version to the Parisians in 1803. While the demonstration had been successful in itself, it had failed to convince anybody of the value of engine power aboard ship—even the *Clermont* needed quite some time to break down the inertia of thousands of years of sailing tradition.

When residing in France Fulton had also invented and built a successful small submarine, the *Nautilus*, which swam and dived in the River Seine without any mishap. The propelling power for that boat was muscular power, of course. Fulton had been quick to realize the military value of submarines and had offered vessels of the type of his *Nautilus* to the first consul of the French Republic, a gentleman by the name of Napoleon Buonaparte. But the first consul—who hated the Italian "u" in his last name—had rejected the offer. It was not because he doubted that larger and seaworthy submarines could be built. Napoleon rarely doubted the possibility of any invention as long as the inventor could tell in reasonably clear terms what he wanted to do and how he wanted to do it. Napoleon was one of the least conservative men of his time, a man who offered and paid large sums of money to early chemists who made sugar from sugar beets instead of sugar cane that would not grow in France, he

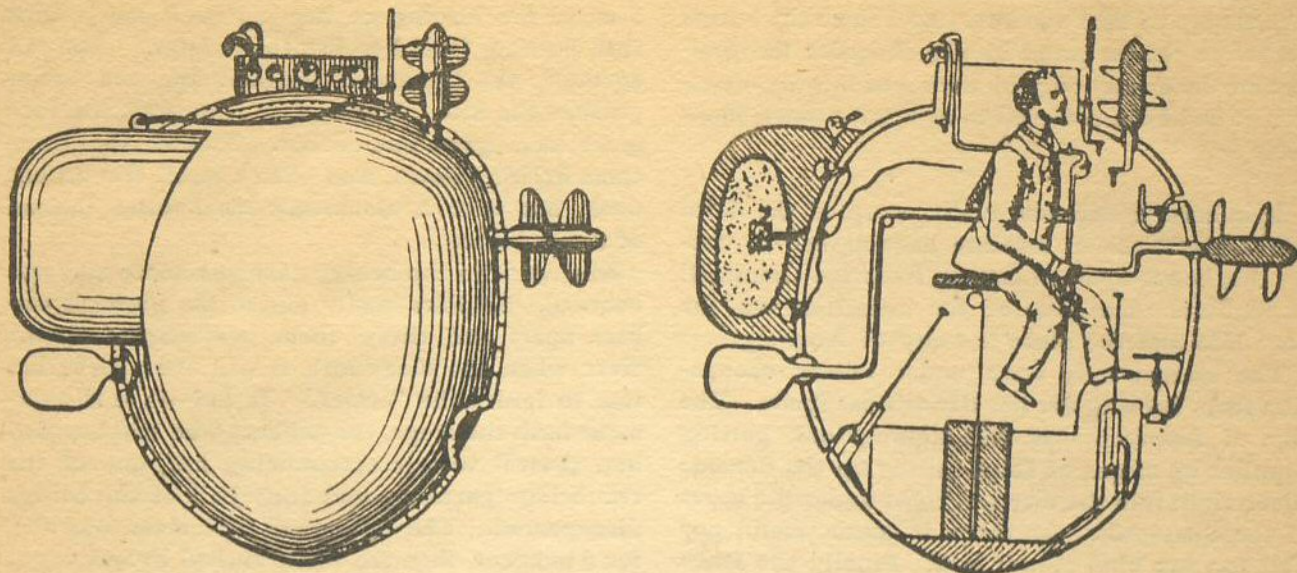
was one of the first men who wanted to build a tunnel *sous la Manche*, under the English Channel from Calais to Dover when his political relations with England were still good—Napoleon, as I said, did not doubt that submarines could be built. But he was a soldier educated in the tradition of open battle, he wanted to face an open enemy openly, with the bigger cannon on his side. He simply did not *like* submarines.

Having been rejected, Fulton went to England, only to experience a British version of the same rebuttal. He then hinted at French invasion plans and devised a barrage of submerged contact mines. It was "no" again. Back in his native America he advocated a variety of torpedo and got so far as to have a test arranged. But, as Fulton pointed out, the commander of the vessel to be torpedoed knew what Fulton was going to do—and when he was going to do it—while he himself was left in ignorance about the defenses of the vessel. The obvious result was that the test did not come off so very well.

Judging from all this one might be tempted to say that without Fulton there would be no steam-propelled surface navy, no submarines and consequently no depth charges, no mines and, therefore, no mine layers and mine sweepers, no torpedoes and, of course, no torpedo-carrying vessels.

As a matter of fact the difference would hardly amount to anything. Somebody else would have thought of putting a steam engine aboard a vessel. Somebody else would have conceived the naval mine—in fact most of the later designers of naval mines never knew that Robert Fulton had toyed with that idea—and submarines had been invented before Fulton and were again invented after him.

Still, the person of Robert Fulton is something like a focal point. Earlier half-forgotten ideas were taken up by him and advanced, new ideas formed constantly in his imaginative brain and even though many of the later inventors of naval



BUSHNELL'S SUBMARINE.

Fig. 1. The first war-time submarine—a real, one-man job, where the man did all the work of propelling, pumping and controlling.

weapons knew Fulton only as the inventor of the steamship and as the inventor of some peaceful machinery for spinning and weaving, the history of their ideas converges on Fulton's name in retrospect.

As for the submarine, only two successful attempts had been made before Fulton constructed his *Nautilus*. Disregarding some obviously fantastic claims, the honor of having invented the first successful submarine goes to a Dutchman by the name of Cornelis van Drebbel, often called Cornelius Drebbel. It was a weighed rowboat, covered with leather and propelled by oars projecting from leather cones. One of his boats, built in 1622, is said to have carried several passengers, among them King James I, from London to Greenwich at an average depth of ten to fifteen feet, traveling "fast," since it was propelled by twelve experienced rowers.

The other successful attempt was David Bushnell's *Turtle*, so called because it looked as if it had been put together from the carapaces of two enormous turtles. It seated one man who could make it sink by admitting water to the bottom compartment and who lorded over an impressive array of handles and hand wheels. One of them operated a pump which was to eject ballast water, the other moved a rudder, one turned a horizontal and another a vertical propeller and one finally operated a screw by means of which a cannon powder demolition charge was to be attached to the wooden hull of an enemy warship below the water line. The *Turtle* had been designed to help win the Revolutionary War and it was consequently employed to attack the British fleet which block-

aded New York Harbor. The attack took place in 1777. The *Turtle*, manned by Sergeant Ezra Lee, was towed by a rowboat beyond Governor's Island under the cover of darkness, submerged and attacked one of the British men-of-war. It seems that Ezra Lee picked a spot where solid iron bracings held the rudder of the vessel in place—he could not see when submerged—at any event his screw failed to bite, the incoming tide tried to sweep the *Turtle* away and after some twenty minutes the air got so bad that Lee had to come to the surface. It was light enough to see clearly by then; he had to flee and abandon the mine which exploded harmlessly in the middle of the harbor. But Lee and the *Turtle* got away, David Bushnell's first and only submarine was later sunk ingloriously while aboard a ship which was to transport it elsewhere for another attempt at warlike action.

I do not know how the charge carried by the *Turtle* was called, nor whether Bushnell, Lee or anybody else went to the trouble of inventing a special name for it. The man who coined a name for underwater charges was Robert Fulton. His term was "torpedo" which then did not mean a weapon of naval warfare but simply the electric eel of South American rivers. It seems, however, that this name took hold in America only for quite a number of decades to come. Farragut, in the battle of Mobile Bay, ordered his captains to "damn the torpedoes"—moored mines, in our terminology—but British writers were more likely to speak of "infernal machines" when referring to mines. The term "mine" seems to have originated with German writers who compared the submerged explosive charge to the buried explo-

sive charge of land warfare. And since the buried explosive charge could be placed under the position of the enemy only by a kind of mining operation it had been referred to as a mine since about 1500.

It is hard to say who really invented the naval mine—historians of warfare have agreed to confer this honor upon an Italian, Federigo Gianibelli of Mantua. The year of the invention was the year 1585 and the place the city of Antwerp.

The Netherlands were under enemy occupation then, fighting for her life against Spain. The city of Antwerp was still holding out, getting supplies by means of ships sailing up the Schelde River right into the city and right under the noses of the Spaniards. Antwerp, it seems, could pay well for any kind of war risk. Finally the Duke of Parma decided to put a stop to this "smuggling" and had a sturdy bridge built across the wide river. It was a masterpiece of engineering for its time, twenty-four hundred feet long, with a fort at each end and protected by one hundred and seventy big guns, not counting the batteries on the war vessels stationed next to the bridge. Heavy floating rafts were anchored above and below the bridge for additional protection, "one bow-shot away," as the old descriptions say.

The Antwerpens knew that they had either to starve and surrender or to destroy the bridge, and plans for an enormous vessel, designed to carry one thousand soldiers for a mighty assault, were drawn up. Then Gianibelli came with a plan of his own. He was at first refused, but then given two small vessels, of sixty and seventy tons respectively, named *Fortune* and *Hope*.

Gianibelli proceeded quickly to have them converted into what later was called a Demon Ship. A solid floor of masonry was placed along the bottom of the ships. On that floor he built the "crater," a box of masonry forty feet long, three and one half feet high by three and one half feet wide. The walls were five feet thick. The "crater" was then packed with cannon powder and covered by a six-foot roof, consisting of tombstones placed on edge. The space between the masonry box and the hull of the ships was filled with cannon balls, old chains, stones, marble slabs and anything heavy that came to hand. Then the whole was floored over and some wood was heaped on the deck.

In March, 1585, everything was ready for the attack. A large number of small vessels, heaped with dry wood and set afire, was sent drifting down the river, the Spaniards were to believe that the Antwerpens wanted to set their bridge afire. They did believe it and were greatly amused by the idea; laughing and joking, they roved to the burning vessels, boarded them and pulled the fires apart. Then the *Fortune* drifted down, with

a small fire blazing on her top deck and a slow fuse burning inside to fire the "crater." She ran aground, the Spaniards boarded her and extinguished the fire. Nothing else happened, the fuse must have gone out earlier. Finally the *Hope* came drifting down, also with a small fire on her deck, but with a clockwork mechanism instead of a slow fuse.

She ran into the bridge near one shore and was boarded. Soldiers busily pulled the glowing embers apart and threw them overboard into the river when the clockwork struck the spark that was to ignite the "crater." It did—in one enormous flash the *Hope*, the soldiers who had boarded her, several vessels surrounding her, one of the two bridge garrisons and fully half of the bridge disappeared. The bottom of the river was dry for a moment, then the water rushed in and swept splinters and corpses away. The bridge was destroyed, a thousand enemies killed in one instant.

If the Dutch had attacked as planned, they would have won—but their admiral, Jacobzoon by name, was frightened himself and did not issue any orders. Some time later Antwerp fell, but Gianibelli had meanwhile disappeared. It was later learned that Queen Elizabeth had called him to London. What he actually did is not known, but the Spanish armada lived in constant fear of the Demon Ships and once a part of it was destroyed because it ran away from small burning but otherwise harmless vessels—having been deliberately fooled into believing that they were Demon Ships.

The *Hope* is now classified as what it was, a gigantic floating mine, a weapon that is by no means obsolete as the British proved when they ran the explosive-laden old United States destroyer, *Campbeltown*, into the lock gates at St. Nazaire.

The first stationary—moored—naval mines did not appear until about three hundred and fifty years after Gianibelli's exploit. They were sown in the waters of the Black Sea during the Crimean War and they harassed the movements of the British fleet blockading Kronstadt, the harbor of St. Petersburg—now Leningrad.

Little is known about the mines used in the Black Sea, except that they caused no important damage since they were treated with the utmost respect by both sides. The Kronstadt mines did not do any better as far as effectiveness is concerned but the more important details of their construction have been preserved by a British naval officer whose account was published in William F. Williams' "England's Battles by Sea and Land," which was published in 1856. Referring to them as "infernal machines," the officer wrote:

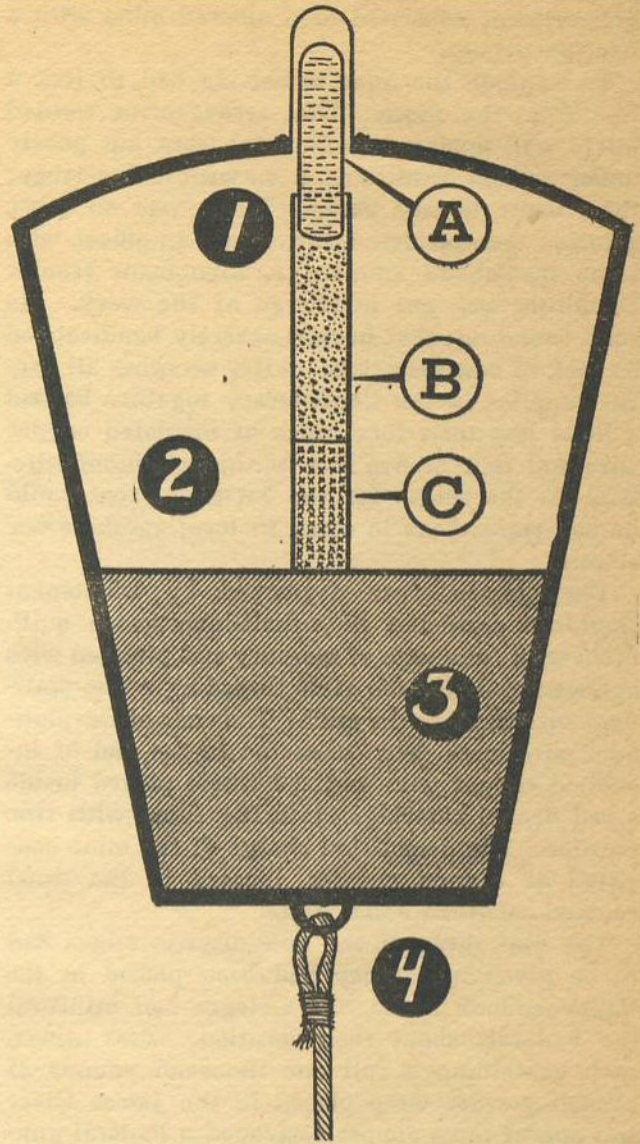
Each machine consists of a cone of galvanized iron, sixteen inches in diameter at the base, and twenty inches from base to apex, and is divided into three chambers;

the one near the base being largest and containing air, causes it to float with the base uppermost. In the center of this chamber is another which holds a tube with a fuse in it, and an apparatus for firing it. This consists of two little iron rods, which move in guides, and are kept projected over the side of the base by springs which press them outward. When anything pushes either of these rods inward, it strikes against a lever which moves like a pendulum, in the fuse tube, and the lower end of the lever bends or breaks a small leaden tube, containing a combustible compound, which is set on fire by coming in contact with some sulphuric acid held in the capillary tube, which is broken at the same time, and so fires the fuse which communicates with the powder—about nine or ten pounds—contained in the chamber at the apex of the cone. At the extreme apex is a brass ring, which is attached to a rope and some pieces of granite, which moors them about nine or ten feet below the surface—

These submerged mines were probably regarded mainly as a curiosity, something some Russians had dreamed up during long winter evenings but something that was not to be feared very much as a weapon of war, especially since the experiences of the campaign had shown that they did little damage.

This idea was to undergo a fairly sudden and quite complete revision some ten years later, when the American Civil War came. The Confederates soon noticed to their dismay that they were extremely vulnerable against naval attack. The Confederacy had not a single real warship of its own, but many of its important cities were either directly at the shore or situated not far from the shore on large and deep rivers. A Federal warship could have sailed up the James River right into the heart of Richmond. Something had to be done about it and it had to be done quickly. Submerged mines were suggested by literally scores of people and the suggestion was finally adopted. While the first Confederate mines resembled the Russian Kronstadt mines in outward appearance their design was new—in fact Confederate engineers hurriedly invented the prototypes of most modern naval mines in existence.

Their mines consisted of a truncated cone, made of one-half-inch boiler plate or any other heavy sheet metal that came to hand. The lower half of the inverted cone was filled with cannon powder, the upper half left empty to provide buoyancy. Through the center of the air space a thin-walled tube was inserted, its lower half filled with fine-grain rifle powder, its upper half with a mixture of powdered sugar and chlorate of potassium. On top of that mixture a glass tube containing concentrated sulphuric acid was mounted; it projected through a hole in the cover to the outside. For protection this glass tube was surrounded by a sheath of copper or lead. Some of the later designs had four or five such "horns," jutting out at various angles. When a ship's bottom hit the mine which was moored under water like the Russian mines, it bent the



Early naval mine, designed by the Confederates during the Civil War.

1. Delayed action fuse.
2. Air space for buoyancy.
3. Demolition charge of cannon powder.
4. Mooring cable.

Detail of fuse: A. Glass tube filled with concentrated sulphuric acid. B. Mixture of chlorate of potassium and powdered sugar. C. Fine grain gunpowder.

leaden horn, breaking the glass tube. The sulphuric acid flowed out, dripped into the mixture of chlorate of potassium and powdered sugar and caused a chemical reaction generating enough heat to ignite the fine-grained powder. This, in turn, set off the cannon-powder charge.

But these automatic or contact mines had a big drawback. They would explode indiscriminately when rammed by a ship, not waiting to see whether it was an enemy or a friendly vessel. Consequently the Confederates set out to construct "observation" or controlled mines, mines which would be exploded from an observation post ashore. The

first attempt consisted of a moored mine with a friction primer.

To explode the mine somebody had to jerk a line from the shore. That arrangement worked fairly well during experimental tests, but poorly under normal conditions, i. e., with a line longer than about twenty yards. There was no other solution than electric ignition and an officer with some specialized knowledge, Lieutenant Hunter Davidson, was put in charge of the work. He soon found out that he was severely handicapped by lack of raw materials. After scraping all useful supplies in the Confederacy together he had a little less than four miles of insulated copper wire and four or five feet of thin platinum wire. And all the acids—for the batteries—that could be had were those in stock in local apothecaries' stores.

The electric fuse developed by Lieutenant Davidson consisted of a half-inch goose quill, filled with fulminate of mercury and plugged with beeswax at both ends after threading a fine platinum wire through the quill. The ends of the platinum wire were then connected to the end of insulated copper wire and the whole placed inside a red flannel cartridge cloth bag filled with rifle powder. The demolition charge of the mine consisted of cannon powder, incased in the usual cone of half-inch boiler plate.

The first three of the new electric mines had to be given up. They had been placed in the Rappahannock River, but a Negro had informed the Federals about their location. Two others, each containing a full one thousand pounds of cannon powder were placed in the James River and one of them almost destroyed a Federal gunboat. It failed to do so only because the watcher was nervous and exploded the mine when the gunboat was still ninety feet away. The water-spout was enormous, it smashed the guards of the gunboat and washed six men overboard. The captain turned his ship around, picked up his men and proceeded down river, passing over the second mine—but the watcher had unwittingly emulated Admiral Jacobzoon and had run away, overawed by the explosion.

Some time later, a Federal warship was actually sunk by an electric two-thousand-pound mine, the first warship ever to be destroyed by the new weapon. The sinking occurred at Deep Bottom in the James River, sixty of the crew of two hundred were killed by the explosion or drowned.

When the British fleet blockaded Kronstadt, wondering about the Russian mines and whether they would work or not, another danger seemed to be getting ready inside that harbor. Years before, a Bavarian by the name of Wilhelm Bauer, a low-ranking noncommissioned officer of a regiment of artillery, had built a small hand-powered

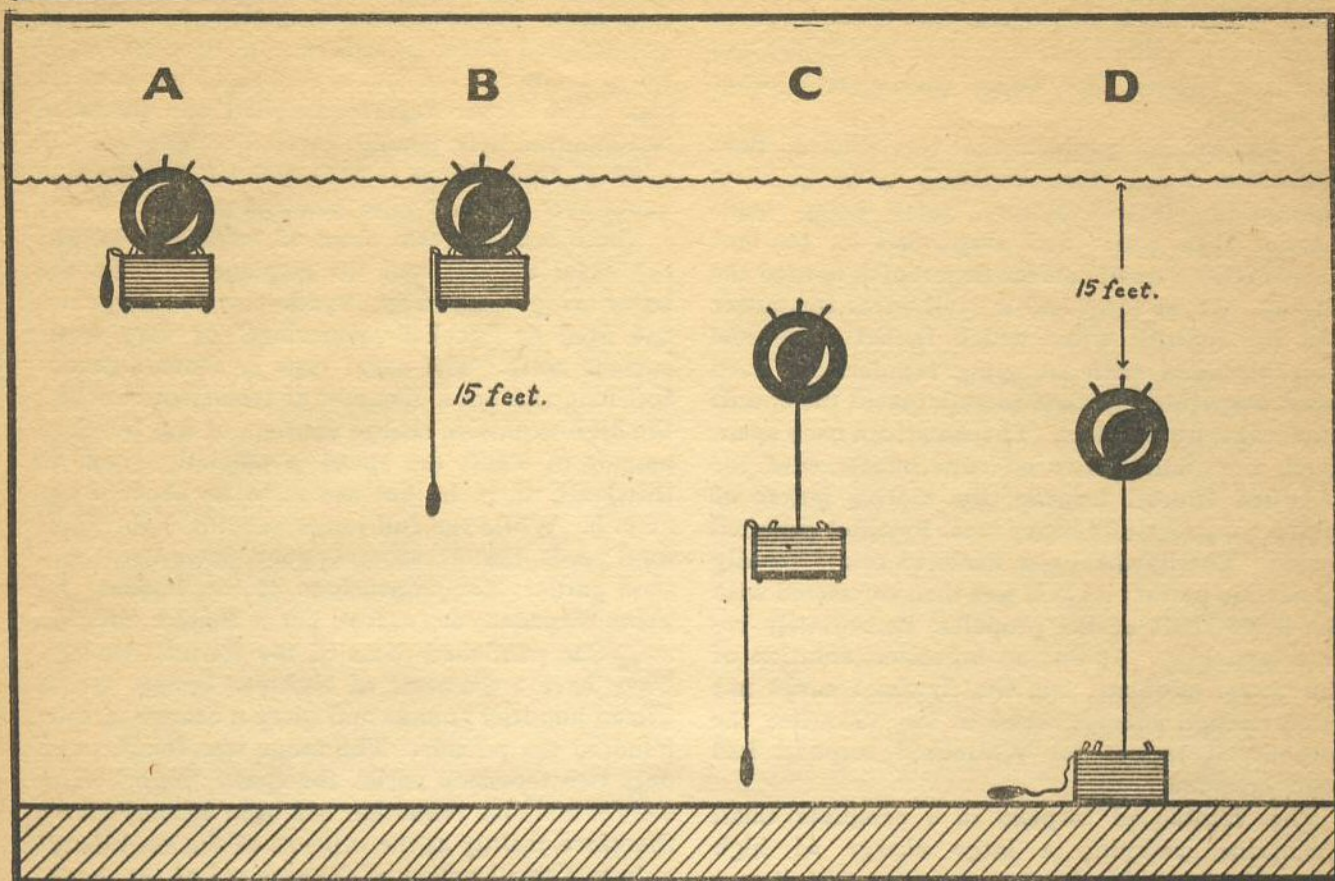
submarine. During its first test run it had sunk in the harbor of Kiel, but every expert knew that that had happened because a commission of "economy experts" had forced him to use boiler plate half as thick as he had planned and had greatly "simplified" the design. Now this man Bauer had been hired by the Russian Grand Duke Aleksandr to build him a much larger submarine. Money did not matter; he might be successful this time. He was; his second submarine made more than one hundred and fifty successful underwater runs, but it did not see any action. The British did not experience a submarine attack then, which would have been the second in the history of their navy.

But submarines did play a role in the Civil War. And the weapon they used was rather odd; it is now known as a spar torpedo. It consisted of a copper cylinder, holding some ninety pounds of cannon powder, and fastened to the end of a long spar or boom. Like the modern torpedo it was used by two types of craft, by true submarines and by small surface craft.

At first the Confederates had put some trust in a so-called line torpedo, a contact mine towed behind the submarine on a three-hundred-yard line. The theory was that the submarine would approach the enemy surfaced, then dive under the enemy vessel and surface again, so that the towed mine would strike the vessel on the side away from the submarine. It worked that way during tests on a smooth inland lake, but proved too dangerous to the submarine in the choppy water of the open sea. The spar torpedo was then substituted for the line torpedo.

Since the submarines of the Confederacy proved very dangerous to their own crews—the first of them had to be scuttled in the Bayou St. John, the second had foundered in Mobile Bay when a sudden squall blew up and the third, the *Hunley*, had drowned thirty-five men in five sinkings before seeing its first and final action—the spar torpedoes were used from small surface craft first. There were the so-called *Davids* , small steam-propelled craft with hardly any freeboard, carrying a spar torpedo in front. Ordinarily the spar torpedo was raised out of the water to prevent accidental explosion from striking driftwood, it was lowered into the water immediately before striking the target.

The first *David* attacked the Federal ironclad *New Ironsides* with a sixty-pound spar torpedo in the late evening of October 5, 1863. Lieutenant Glassell, the commander of the vessel, steamed far out to approach his victim from seaward. This method worked, when it was sighted by the lookouts on the *New Ironsides* it was already too close for the big guns of the ironclad. A few musket shots were fired in a hurry, then



The laying of a barrage mine progresses in four (automatic) steps. A. The mine, having just been dumped overboard by the mine-laying vessels, floats at the surface. B. The plummet begins to unreeel until its line has attained the length for which it has been set, in this case fifteen feet. C. As soon as the plummet line has reached full length, the box anchor begins to sink, meanwhile unreeling the mooring cable. D. When the plummet touches the bottom, the winch of the mooring cable is arrested. Box anchor sinks to the bottom, dragging the mine below the surface. This way a certain depth for the mine is insured, its depth below the surface is the same as the length of the plummet line.

the torpedo touched. But the *New Ironsides* suffered only negligible damage, she was too powerful to be ruined by sixty pounds of weak gunpowder. The crew of the *David* was thrown overboard by the explosion, or jumped and generally gave their own vessel up as lost. One of the men clambered up on the *New Ironsides* and was taken prisoner. The commander was picked up by a Northern coal schooner and suffered the same fate. The machinist swam around in the dark for quite some time and found, finally, to his great surprise, the *David* still afloat, with the pilot, who could not swim, desperately clinging to the gunwale. Together the two men got the engine working and took the *David* back to Charleston. Eight more *David*s were built, but did not see action.

In February, 1864, the third Confederate submarine, the *Hunley*, was at last ready for action. It attacked the Union fleet on February 17th, picking the corvette *Housatonic* as its victim. Because of the bad record of the *Hunley* the crew was apparently scared to dive and attacked in an awash position, with hatches open. The *Housatonic* sank—first warship to be destroyed by a

submarine—but since the water was only twenty-eight feet deep at that spot most of the crew saved themselves by climbing into the rigging. The *Hunley* sank with all hands aboard. Divers later found the submarine one hundred feet from the wreck of the *Housatonic*, without apparent damage.

Not all attacks with spar torpedoes were as suicidal. In October, 1864, Lieutenant Cushing "torpedoed" the Confederate ironclad *Albemarle* by means of a steam launch on the Roanoke River. The ironclad was surrounded with floating logs for just such an attack, but Lieutenant Cushing managed to break through. The *Albemarle* and the steam launch sank, but Lieutenant Cushing saved himself by jumping overboard in time and swimming to the shore.

When the Civil War was over and war experts had examined all the data carefully and at leisure the results amounted to a confirmation of Fulton's early dreams. Submarines were feasible, and so were mine barrages. So was the spar torpedo, also advocated by Fulton—but it was too sui-

cidal. What had to be done was to improve on mines, build submarines that were safe to use and invent a torpedo that would have motive power of its own.

It was the last problem that was attacked first. Numerous types were invented, some of them containing electric motors, some being made heavier than water and suspended by ten-foot chains from a small surface float which housed the engine. All of them had to trail wires for power and for control; wires which fouled or became short-circuited with annoying regularity. Even when everything worked as anticipated the speeds obtained were too slow. The American navy spent much time and money on experiments with the so-called Howell torpedo, the motive power of which consisted of a heavy steel flywheel mounted inside. The flywheel was made to rotate rapidly by outside power; its axle was then connected with the drive shaft of the propeller immediately before launching. It was an ingenious solution of the power problem, but the flywheel could not store enough energy. And in the meantime *the* torpedo of today, the Whitehead torpedo, had been invented.

The Whitehead torpedo is a complete small submarine, carrying a large charge of high explosive in its head. One may say that it is a "Demon Ship," reduced in size and converted into a submarine. To conceive the Whitehead torpedo one had to imagine a model submarine, launched bodily at the enemy. The father of this idea, it is said, is the Austrian Captain Luppis. And it is all too likely that Luppis took his cue from Wilhelm Bauer.

Before Bauer was called by Grand Duke Aleksandr he had tried to sell his submarine to England, to France and to Austria, traveling around with a working model five or six feet long. He had demonstrated this model to the emperor of Austria in the Adriatic Sea, a demonstration which was highly successful but without consequences. It is probable that Captain Luppis witnessed the demonstration, or heard about it from a witness. Being anything but a mechanic himself, he approached the manager of an engineering firm in Fiume, a Scotsman by the name of Robert Whitehead.

Whitehead was interested and went to work on a model, having only his son and one workman helping him, to insure secrecy. For this reason it took over two years until the first Whitehead torpedo was finished (1865). It weighed about three hundred pounds, carried a charge of eighteen pounds and moved all of six m. p. h. But it worked and increasing size and speed was only a question of time.

At first two standard sizes were adopted by most navies, the fourteen-inch and the eighteen-inch torpedoes. The smaller type weighed a little more

than seven hundred pounds, carried a charge of one hundred fifteen pounds of guncotton and made thirty knots for the first six hundred yards of its run. The larger variety weighed one thousand one hundred fifty pounds, carried a charge of one hundred thirty-three pounds and ran twenty-nine knots over the first nine hundred yards.

There are still two sizes of torpedoes in use, the naval torpedo and the airplane torpedo, the latter being dropped by torpedo-carrying airplanes and fired by "pocket submarines" or very small surface craft. The naval type is about eighteen feet long and has a diameter of twenty-one inches, the high-explosive charge consists of five hundred pounds of TNT, the speed is officially given as thirty-six m. p. h., but seems to be above forty m. p. h. While the full range exceeds eight thousand yards, that accuracy is poor above two thousand yards. The dimensions of the smaller airplane torpedoes are secret, but a British aviation magazine published those of the German variety. They have a diameter of eighteen inches, weigh fifteen hundred pounds and carry a charge of four hundred ten pounds. The range was found to be only two thousand yards, the speed "high." The weight and size reduction has been accomplished, therefore, mainly at the expense of the machinery, only to a small extent at the expense of the demolition charge.

All modern torpedoes consist of two parts: the "model submarine" and the "head." The latter comes in three varieties. One is the war head, consisting of the high-explosive charge and a device called the "pistol" which fires that charge. This is the head for actual combat use. For practice firing there are two types of heads. If it is the machinery of the torpedo that is to be tested, a "blowing head" is attached to it. It is filled with enough water to make it weigh as much as a war head. When the torpedo has run out of power, a small flask of compressed air forces the water out of the head so that the torpedo floats to the surface and can be picked up. If the torpedo is fired for target practice, it is fitted with a "collision head," designed to absorb the shock of the impact.

The submarine part of the torpedo is completely taken up by fuel containers and machinery. The engine consumes a mixture of fuel oil vapor and compressed air, augmented by a thin jet of water which is converted into live steam and thus increases the bulk of the combustion gases. There are two screws rotating in opposite directions to eliminate torque, there are horizontal and vertical stabilizing vanes and rudders, there are gyro mechanisms for maintaining the course and the depth for which the torpedo has been set, the latter varying from about five to about thirty feet. But submarines can fire torpedoes when at a depth of

seventy-five feet below the surface and airplanes drop their torpedoes from fifty to one hundred feet above the surface—the torpedoes rise or sink automatically to the depth for which their mechanism has been adjusted.

By the time these torpedoes were fully developed the first modern submarines were ready to use them. The *Davids* had been re-created as torpedo boats and, somewhat incidentally, mines had been modernized. Then the Russo-Japanese War came with plenty of naval action. And after it was over and the heavy ship losses sustained by both sides had been tabulated as to causes, everybody was greatly surprised to see that no ship had been sunk by torpedo hits, but that many had succumbed to mines.*

Evidently mines were worth more than anybody had thought—and this realization had two widely divergent results. One consisted simply and plainly in increased activity of the proper sections in the various navy departments. The other consisted in thirteen articles drawn up at the Second Hague Conference in 1907 which all but outlawed naval mines. Mines were not to be laid in waters where they might harm neutral shipping, mines were not to be laid off the enemy's coast for the purpose of intercepting purely commercial shipping, et cetera, et cetera. That convention had precisely the same effect as any too severe law, nobody tried any too hard to obey it knowing that nobody else would. In fact, the first German ship loss during the first World War was the converted mine-layer *Königin Luise* , caught while mining British waters and not long after the Germans lost a vessel which ran into a British mine in German waters.

Generally speaking, however, the British admiralty was caught napping as far as mines were concerned. They had only small stores—some twenty thousand or so—and most of them had to be swept up again after they had been laid, being found unreliable and defective. American productive capacity saved the day, and American productive capacity resulted in the largest single job of mine laying ever done: the Great North Sea Barrage. But first another invention had to be made.

The improvements of mines made since the time Confederate engineers invented their "torpedoes" hurriedly, concerned mainly two things—manufacture and method of mooring. The spherical shell had been adopted generally, with a separate cylindrical charge fitted inside, thus providing buoyancy space. The mooring had been greatly improved, mines adjusted themselves auto-

matically to any depth of water within wide limits. This was accomplished by designing a box anchor with a separate small weight, called plummet, and an automatic winch inside the box. The plummet line was "set" for a certain depth, say fifteen feet, then the whole mine was thrown overboard. For a moment it floated at the surface while the plummet line ran out to the full length for which it had been set. Then the weight of the plummet released the catch of the winch, the mooring cable was payed out and the box anchor, with the plummet line dangling down from it, began to sink. As soon as the plummet touched bottom, the winch was arrested, the heavy box anchor, sinking to the bottom of necessity pulled the mine down, to precisely the same depth as the original length of the plummet line.

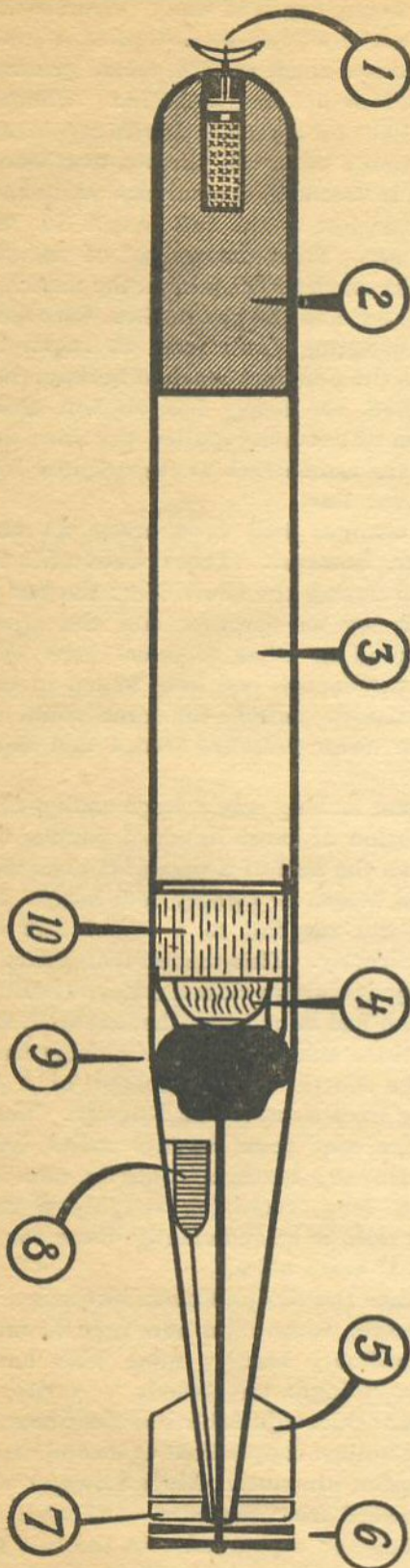
Little changes had been made in the fuse mechanism, however. There were still the two types used during the Civil War; the one ignited electrically by an observer and the other with horns, exploding when a vessel bent the horn. A safety mechanism had been added in the form of a hydrostatic switch, the mine could explode only when water pressure forced that switch inward.

What was lacking was a large radius of action. The explosion of three hundred pounds of TNT would push the hull of a vessel in, even when the vessel was fifteen or twenty feet away. But the mine did not respond to a vessel that did not touch it directly. This meant that mines had to be laid very densely to close a waterway effectively. The British had mined the Channel with fair success, but there existed a plan of closing the North Sea in the North, too, by means of a barrage stretching from Scotland to Norway. The Channel barrage was some twenty miles long, the Scotland-Norway barrage would be two hundred fifty miles long, requiring roughly a thousand mines per mile to be sufficiently dense for surface craft and U-boats alike.

It was then that Ralph Cowan Browne of Salem, Massachusetts, invented a new type of mine. He took an ordinary barrage mine with horns and added two things: an electric detonator and a thin copper cable, adjustable like the plummet line, but with a hollow copper float at its end, instead of a solid leaden plummet. Thus a copper wire extended upward from the mine—and when an iron hull touched the copper wire in the salt solution called sea water it was precisely the right electrochemical combination for the electric detonator to work on. The antenna, as it was called, increased the danger orbit of each mine from three to thirty feet; the mining of the North Sea could be begun.

Nine thousand five hundred mines, laid in twenty parallel rows, were used to block the Channel again; simultaneously the British began to mine the area east of the Orkney Islands and Scapa

*Even today the tabulations of the causes of ship sinkings show figures different from what might be expected. Of the first eight hundred ships sunk in the present war submarines accounted for two hundred twenty, mines for about one hundred eighty, airplanes—both bombs and torpedoes—for about one hundred, surface craft for the remainder.



21-inch Whitehead Torpedo With War Head.

Length: 18 feet.

(1) "Pistol" consisting of a plunger which, on impact, fires a percussion cap. The percussion cap fires the priming charge, which in turn sets off (2) 500 pounds of TNT. (3) Container for compressed air. (4) Container for fuel oil. (5) Stabilizer vanes. (6) Twin propeller rotating in opposite directions. (7) Rudders. (8) Steering and depth-setting gear. (9) Combustion chamber, air and engine. (10) Container for water.

Flow, leaving only a carefully watched ten-mile channel near the islands, for the emergency use of the Grand Fleet. Pushing eastward from that area the United States navy laid fifty-six thousand six hundred eleven mines in a sector one hundred thirty miles in length, the final gap east of that sector was closed by the Royal and the United States navies in collaboration. The British total in that barrage was fifteen thousand ninety-three mines, but most of them were of American manufacture. The more difficult job, brilliantly executed throughout, was the removal of those mines after the war was over, not the laying.*

It is not very well known that mine sweeping is a Russian invention. When the waters of the Black Sea were infested with mines during the Crimean War the Russians dispatched small vessels to drag weighed lines through the water. The lines were to break the mines from their moorings so that they could be destroyed by means of rifle fire. This method was then regarded as a makeshift, especially because of the loss of some of the mine-sweeping vessels. But when the Federals had to clean up rivers in which Confederate mines were hidden they could not think of a better way and the method is still essentially the same. The only major change occurred when Lieutenant Commander Sir C. D. Burney, R. N., invented the paravane in 1916, enabling single vessels—instead of pairs—to sweep for mines.

Looking like a ten-foot model of a strange airplane with stubby wings, the paravane stays away from the ship and at a predetermined depth when being towed. The towing cable engages the mooring cable of the mine and guides it into a cutting blade. Released mines, which float to the surface, are then disposed of by rifle and machine-gun fire. Antenna mines are, incidentally, much easier to sweep, when the steel cable touches the copper antenna they simply blow up.

Since the Great North Sea Barrage was laid down and taken up again a few new types of mines have made their appearance. One of them is a free floating type, the "legitimate use" of which is to be thrown into its wake by a fleeing vessel so that the pursuers may run into it. Such mines are to be designed in such a way that they

* The western sector of the North Sea Barrage, beginning ten miles east of the Orkneys and extending fifty miles eastward from that line, consisted of nine lines of United States mines dangerous to surface craft and to submarines at periscope depth, three lines of United States mines at one hundred sixty feet and three lines of United States mines at two hundred forty feet, all with long antennae giving them a danger orbit of some seventy feet. The center sector was one hundred thirty miles long and consisted of one line of British mines dangerous to surface craft, one line of British mines at nine-five feet, eight lines of United States mines dangerous to surface craft and to submarines at periscope depth and four more lines of United States mines, two at one hundred sixty and two at two hundred forty feet with seventy-foot antennae. The eastern sector near the Norwegian coast was sixty miles long and consisted of eight lines of British mines, two each at fifteen, sixty-five, ninety-five and one hundred twenty-five feet, reinforced by four lines of antenna mines of United States make near the surface. To make sure that the center and the eastern sectors touched six lines of antenna mines were laid over the junction where a mistake in ascertaining position might have caused a gap.

stay afloat for only one hour and then become harmless. The special variety I have in mind here was invented by the Swedish captain, Karl Iskar Leon. It consists of a steel cylinder with the TNT charge, fitted with a contact fuse, a hydrostatic switch, a small electric motor, an electric battery and a small propeller. It swims, or rather sinks, in a vertical position, with the propeller at its base. Upon reaching a certain depth the hydrostatic switch closes the circuit, the propeller begins to turn and pushes the mine to the surface. There the circuit is broken, the mine sinks again and the cycle starts anew, until the battery is exhausted.

Another new type of mine, which received much publicity, was the German magnetic mine, sown by means of parachutes from airplanes into the shallow waters of English rivers and estuaries. These mines were shaped like airplane bombs, made entirely of nonmagnetic metals—mainly aluminum—and weighed twelve hundred pounds, with a high-explosive charge of six hundred sixty pounds or three hundred kilograms. The diameter was about two feet, the length eight feet, dimensions obviously chosen to make the mines fit into the attachments of torpedo-carrying airplanes. Being heavier than water they sank to the bottom. The usual hydrostatic switch made them stay harmless as long as they were subjected to atmospheric pressure only. This is the reason why their construction is known: Commander J. G. D. Ouvry of *HMS Vernon* succeeded in taking one that had dropped on the bank of a river apart without being blown to pieces.*

Misled by the term "magnetic mine," some writers told fanciful tales how these mines rise from the bottom mud and follow iron ships, being attracted by their hulls and machinery. Actually nothing of the sort happens. The name refers only to the detonating mechanism which responds to the magnetic field created by a large mass of iron and explodes the charge when that field reaches a certain intensity. Once this was known it was easy to find remedies doing both,

*As a kind of "reprisal action" the German radio announced soon after that *HMS Vernon* had been sunk by a German submarine or a German mine. This was decidedly peculiar, inasmuch as *HMS Vernon* is not the name of a ship. It is the name of the Mine School, the division for mine warfare of the Royal Navy.

exploding the mines at will and protecting the ships. The first was accomplished by towing powerful electromagnets on floats behind wooden ships. The second was done with the so-called degaussing belt, a device creating an artificial counterfield to neutralize the natural magnetic field of the vessel.

The Germans, thereupon, discontinued the use of magnetic mines and substituted acoustic mines, with a detonating mechanism sensitive to the sound of a ship's engines. So far their construction has not been revealed but it has been reported that these mines are as easy to deal with as magnetic mines.

This article would be incomplete, however, if one naval weapon were not mentioned which is closely related to the naval mine: the depth charge. When Robert Fulton built his *Nautilus* and designed his "torpedoes" he failed to conceive a weapon which would be useful to combat enemy undersea craft. It is possible that he doubted there could be such a weapon—many naval experts wondered just what could be used against a submerged submarine.

The answer was simple: a mine. A barrage mine when a passage was to be blocked to submarines—the North Sea Barrage accounted for about a dozen known—and a free mine when a sub was caught on the high seas. Not a floating mine, of course, but a sinking mine, a mine without air space for buoyancy and with a hydrostatic switch that was coupled with the fuse mechanism to explode the mine at or near the suspected depth of the submarine. Since water is to all intents and purposes incompressible, any explosion under water assumes the character of a sudden and irresistible "squeeze." It works on the water, too, of course, but unlike the hull of a submarine, water cannot be squeezed effectively.

This goes for all explosions occurring under water and it is the reason why torpedoes and mines of all types are so potent and why a very close miss of an airplane bomb or an artillery shell might cause more severe damage than a direct hit. The direct hit may blow off a deck, damage superstructure and annoy the crew; the near miss, its pressure transmitted by the incompressible water, is apt to stave in the sides below the water line.

THE END.





NERVES

By Lester del Rey

● A company doctor, simply caring for the men in a big industrial plant, doesn't ordinarily lead a particularly exciting life. But when its National Atomic Products, and an atomic furnace gives way, releasing unknown, unstable and deadly products—

Illustrated by Orban

I.

The graveled walks between the sprawling, utilitarian structures of the National Atomic Products Co., Inc., were crowded with the usual five-o'clock mass of young huskies just off work or going on the extra shift, and the company cafeteria was jammed to capacity and overflowing. But they made good-natured way for Doc Ferrel as he came out, not bothering to stop their horseplay as they would have done with any of the other half hundred officials of the company. He'd been just Doc to them too long for any need of formality.

He nodded back at them easily, pushed through, and went down the walk toward the Infirmary Building, taking his own time; when a man has

turned fifty, with gray hairs and enlarged waistline to show for it, he begins to realize that comfort and relaxation are worth cultivating. Besides, Doc could see no good reason for filling his stomach with food and then rushing around in a flurry that gave him no chance to digest it. He let himself in the side entrance, palming his cigar out of long habit, and passed through the surgery to the door marked:

PRIVATE
ROGER T. FERREL
PHYSICIAN IN CHARGE

As always, the little room was heavy with the odor of stale smoke and littered with scraps of this and that. His assistant was already there,

rummaging busily through the desk with the brass nerve that was typical of him; Ferrel had no objections to it, though, since Blake's rock-steady hands and unruffled brain were always dependable in a pinch of any sort.

Blake looked up and grinned confidently. "Hi, Doc. Where the deuce do you keep your cigarettes, anyway? Never mind, got 'em. . . Ah, that's better! Good thing there's one room in this darned building where the 'No Smoking' signs don't count. You and the wife coming out this evening?"

"Not a chance, Blake." Ferrel stuck the cigar back in his mouth and settled down into the old leather chair, shaking his head. "Palmer phoned down half an hour ago to ask me if I'd stick through the graveyard shift. Seems the plant's got a rush order for some particular batch of dust that takes about twelve hours to cook, so they'll be running No. 3 and 4 till midnight or later."

"Hm-m-m. So you're hooked again. I don't see why any of us has to stick here—nothing serious ever pops up now. Look what I had today; three cases of athlete's foot—better send a memo down to the showers for extra disinfection—a guy with dandruff, four running noses, and the office boy with a sliver in his thumb! They bring everything to us except their babies—and they'd have them here if they could—but nothing that couldn't wait a week or a month. Anne's been counting on you and the missus, Doc; she'll be disappointed if you aren't there to celebrate her sticking ten years with me. Why don't you let the kid stick it out alone tonight?"

"I wish I could, but this happens to be my job. As a matter of fact, though, Jenkins worked up an acute case of duty and decided to stay on with me tonight." Ferrel twitched his lips in a stiff smile, remembering back to the time when his waistline had been smaller than his chest and he'd gone through the same feeling that destiny had singled him out to save the world. "The kid had his first real case today, and he's all puffed up. Handled it all by himself, so he's now Dr. Jenkins, if you please."

Blake had his own memories. "Yeah? Wonder when he'll realize that everything he did by himself came from your hints? What was it, anyway?"

"Same old story—simple radiation burns. No matter how much we tell the men when they first come in, most of them can't see why they should wear three ninety-five percent efficient shields when the main converter shield cuts off all but one-tenth percent of the radiation. Somehow, this fellow managed to leave off his two inner shields and pick up a year's burn in six hours. Now he's probably back on No. 1, still running through the hundred liturgies I gave him to say and hoping we won't get him sacked."

No. 1 was the first converter around which

National Atomic had built its present monopoly in artificial radioactives, back in the days when shields were still inefficient to one part in a thousand and the materials handled were milder than the modern ones. They still used it for the gentler reactions, prices of converters being what they were; anyhow, if reasonable precautions were taken, there was no serious danger.

"A tenth percent will kill; five percent thereof is one two-hundredth; five percent of that is one four-thousandth; and five percent again leaves one eighty-thousandth, safe for all but fools." Blake sing-songed the liturgy solemnly, then chuckled. "You're getting old, Doc; you used to give them a thousand times. Well, if you get the chance, you and Mrs. Ferrel drop out and say hello, even if it's after midnight. Anne's gonna be disappointed, but she ought to know how it goes. So long."

"Night." Ferrel watched him leave, still smiling faintly. Some day his own son would be out of medical school, and Blake would make a good man for him to start under and begin the same old grind upward. First, like young Jenkins, he'd be filled with his mission to humanity, tense and uncertain, but somehow things would roll along through Blake's stage and up, probably to Doc's own level, where the same old problems were solved in the same old way, and life settled down into a comfortable, mellow dullness.

There were worse lives, certainly, even though it wasn't like the mass of murders, kidnappings and applied miracles played up in the current movie series about Dr. Hoozis. Come to think of it, Hoozis was supposed to be working in an atomic products plant right now—but one where chrome-plated converters covered with pretty neon tubes were mysteriously blowing up every second day, and men were brought in with blue flames all over them to be cured instantly in time to utter the magic words so the hero could dash in and put out the atomic flame barehanded. Ferrel grunted and reached back for his old copy of the "Decameron."

Then he heard Jenkins out in the surgery, puttering around with quick, nervous little sounds. Never do to let the boy find him loafing back here, when the possible fate of the world so obviously hung on his alertness. Young doctors had to be disillusioned slowly, or they became bitter and their work suffered. Yet, in spite of his amusement at Jenkins' nervousness, he couldn't help envying the thin-faced young man's erect shoulders and flat stomach. Years crept by, it seemed.

Jenkins straightened out a wrinkle in his white jacket fussily and looked up. "I've been getting the surgery ready for instant use, Dr. Ferrel. Do you think it's safe to keep only Miss Dodd and one male attendant here—shouldn't we have more than the bare legally sanctioned staff?"

"Dodd's a one-man staff," Ferrel assured him.

"Expecting accidents tonight?"

"No, sir, not exactly. But do you know what they're running off?"

"No." Ferrel hadn't asked Palmer; he'd learned long before that he couldn't keep up with the atomic engineering developments, and had stopped trying. "Some new type of atomic tank fuel for the army to use in its war games?"

"Worse than that, sir. They're making their first commercial run of Natomic I-713 in both No. 3 and 4 converters at once."

"So? Seems to me I did hear something about that. Had to do with killing off boll weevils, didn't it?" Ferrel was vaguely familiar with the process of sowing radioactive dust in a circle outside the weevil area, to isolate the pest, then gradually moving inward from the border. Used with proper precautions, it had slowly killed off the weevil and driven it back into half the territory once occupied.

Jenkins managed to look disappointed, surprised and slightly superior without a visible change of expression. "There was an article on it in the *Natomic Weekly Ray* of last issue, Dr. Ferrel. You probably know that the trouble with Natomic I-344, which they've been using, was its half life of over four months; that made the land sowed useless for planting the next year, so they had to move very slowly. I-713 has a half life of less than a week and reaches safe limits in about two months, so they'll be able to isolate whole strips of hundreds of miles during the winter and still have the land usable by spring. Field tests have been highly successful, and we've just gotten a huge order from two States that want immediate delivery."

"After their legislatures waited six months debating whether to use it or not," Ferrel hazarded out of long experience. "Hm-m-m, sounds good if they can sow enough earthworms after them to keep the ground in good condition. But what's the worry?"

Jenkins shook his head indignantly. "I'm not worried. I simply think we should take every possible precaution and be ready for any accident; after all, they're working on something new, and a half life of a week is rather strong, don't you think? Besides, I looked over some of the reaction charts in the article, and— What was that?"

From somewhere to the left of the Infirmary, a muffled growl was being accompanied by ground tremors; then it gave place to a steady hissing, barely audible through the insulated walls of the building. Ferrel listened a moment and shrugged. "Nothing to worry about, Jenkins; you'll hear it a dozen times a year. Ever since the Great War when he tried to commit hara-kiri over the treachery of his people, Hokusai's been bugs about getting an atomic explosive bomb which will let us wipe out the rest of the world. Some day you'll

probably see the little guy brought in here minus his head, but so far he hasn't found anything with short enough a half life that can be controlled until needed. What about the reaction charts on I-713?"

"Nothing definite, I suppose." Jenkins turned reluctantly away from the sound, still frowning. "I know it worked in small lots, but there's something about one of the intermediate steps I distrust, sir. I thought I recognized . . . I tried to ask one of the engineers about it. He practically told me to shut up until I'd studied atomic engineering myself."

Seeing the boy's face whiten over tensed jaw muscles, Ferrel held back his smile and nodded slowly. Something funny there; of course, Jenkins' pride had been wounded, but hardly that much. Some day, he'd have to find out what was behind it; little things like that could ruin a man's steadiness with the instruments, if he kept it to himself. Meantime, the subject was best dropped.

The telephone girl's heavily syllabized voice cut into his thoughts from the annunciator. "Dr. Ferrel. Dr. Ferrel wanted on the telephone. Dr. Ferrel, please!"

Jenkins' face blanched still further, and his eyes darted to his superior sharply. Doc grunted casually. "Probably Palmer's bored and wants to tell me all about his grandson again. He thinks that child's an all-time genius because it says two words at eighteen months."

But inside the office, he stopped to wipe his hands free of perspiration before answering; there was something contagious about Jenkins' suppressed fears. And Palmer's face on the little television screen didn't help any, though the director was wearing his usual set smile. Ferrel knew it wasn't about the baby this time, and he was right.

"'Lo, Ferrel." Palmer's heartily confident voice was quite normal, but the use of the last name was a clear sign of some trouble. "There's been a little accident in the plant, they tell me. They're bringing a few men over to the Infirmary for treatment—probably not right away, though. Has Blake gone yet?"

"He's been gone fifteen minutes or more. Think it's serious enough to call him back, or are Jenkins and myself enough?"

"Jenkins? Oh, the new doctor." Palmer hesitated, and his arms showed quite clearly the doodling operations of his hands, out of sight of the vision cell. "No, of course, no need to call Blake back, I suppose—not yet, anyhow. Just worry anyone who saw him coming in. Probably nothing serious."

"What is it—radiation burns, or straight accident?"

"Oh—radiation mostly—maybe accident, too. Someone got a little careless—you know how it is. Nothing to worry about, though. You've been

through it before when they opened a port too soon."

Doc knew enough about that—if that's what it was. "Sure, we can handle that, Palmer. But I thought No. 1 was closing down at five thirty tonight. Anyhow, how come they haven't installed the safety ports on it? You told me they had, six months ago."

"I didn't say it was No. 1, or that it was a manual port. You know, new equipment for new products." Palmer looked up at someone else, and his upper arms made a slight movement before he looked down at the vision cell again. "I can't go into it now, Dr. Ferrel; accident's throwing us off schedule, you see—details piling up on me. We can talk it over later, and you probably have to make arrangements now. Call me if you want anything."

The screen darkened and the phone clicked off abruptly, just as a muffled word started. The voice hadn't been Palmer's. Ferrel pulled his stomach in, wiped the sweat off his hands again, and went out into the surgery with careful casualness. Damn Palmer, why couldn't the fool give enough information to make decent preparations possible? He was sure 3 and 4 alone were operating, and they were supposed to be foolproof. Just what had happened?

Jenkins jerked up from a bench as he came out, face muscles tense and eyes filled with a nameless fear. Where he had been sitting, a copy of the *Weekly Ray* was lying open at a chart of symbols which meant nothing to Ferrel, except for the penciled line under one of the reactions. The boy picked it up and stuck it back on a table.

"Routine accident," Ferrel reported as naturally as he could, cursing himself for having to force his voice. Thank the Lord, the boy's hands hadn't trembled visibly when he was moving the paper; he'd still be useful if surgery were necessary. Palmer had said nothing of that, of course—he'd said nothing about entirely too much. "They're bringing a few men over for radiation burns, according to Palmer. Everything ready?"

Jenkins nodded tightly. "Quite ready, sir, as much as we can be for—routine accidents at 3 and 4! . . . Isotope R. . . . Sorry, Dr. Ferrel, I didn't mean that. Should we call in Dr. Blake and the other nurses and attendants?"

"Eh? Oh, probably we can't reach Blake, and Palmer doesn't think we need him. You might have Nurse Dodd locate Meyers—the others are out on dates by now if I know them, and the two nurses should be enough, with Jones; they're better than a flock of the others, anyway." Isotope R? Ferrel remembered the name, but nothing else. Something an engineer had said once—but he couldn't recall in what connection—or had Hokusai mentioned it? He watched Jenkins leave and

turned back on an impulse to his office where he could phone in reasonable privacy.

"Get me Matsuura Hokusai." He stood drumming on the table impatiently until the screen finally lighted and the little Japanese looked out of it. "Hoke, do you know what they were turning out over at 3 and 4?"

The scientist nodded slowly, his wrinkled face as expressionless as his unaccented English. "Yess, they are make I-713 for the weevil. Why you ask?"

"Nothing; just curious. I heard rumors about an Isotope R and wondered if there was any connection. Seems they had a little accident over there, and I want to be ready for whatever comes of it."

For a fraction of a second, the heavy lids on Hokusai's eyes seemed to lift, but his voice remained neutral, only slightly faster. "No connection, Dr. Ferrel, they are not make Issotope R, very much assure you. Besst you forget Issotope R. Very sorry. Dr. Ferrel, I musst now ssee accident. Thank you for call. Good-by." The screen was blank again, along with Ferrel's mind.

Jenkins was standing in the door, but had either heard nothing or seemed not to know about it. "Nurse Meyers is coming back," he said. "Shall I get ready for curare injections?"

"Uh—might be a good idea." Ferrel had no intention of being surprised again, no matter what the implication of the words. Curare, one of the greatest poisons, known to South American primitives for centuries and only recently synthesized by modern chemistry, was the final resort for use in cases of radiation injury that was utterly beyond control. While the Infirmary stocked it for such emergencies, in the long years of Doc's practice it had been used only twice; neither experience had been pleasant. Jenkins was either thoroughly frightened or overly zealous—unless he knew something he had no business knowing.

"Seems to take them long enough to get the men here—can't be too serious, Jenkins, or they'd move faster."

"Maybe." Jenkins went on with his preparations, dissolving dried plasma in distilled, deaerated water, without looking up. "There's the litter siren now. You'd better get washed up while I take care of the patients."

Doc listened to the sound that came in as a faint drone from outside, and grinned slightly. "Must be Beel driving; he's the only man fool enough to run the siren when the runways are empty. Anyhow, if you'll listen, it's the out trip he's making. Be at least five minutes before he gets back." But he turned into the washroom, kicked on the hot water and began scrubbing vigorously with the strong soap.

Damn Jenkins! Here he was preparing for surgery before he had any reason to suspect the need, and the boy was running things to suit him-

self, pretty much, as if armed with superior knowledge. Well, maybe he was. Either that, or he was simply half crazy with old wives' fears of anything relating to atomic reactions, and that didn't seem to fit the case. He rinsed off as Jenkins came in, kicked on the hot-air blast, and let his arms dry, then bumped against a rod that brought out rubber gloves on little holders. "Jenkins, what's all this Isotope R business, anyway? I've heard about it somewhere—probably from Hokusai. But I can't remember anything definite."

"Naturally—there isn't anything definite. That's the trouble." The young doctor tackled the area under his fingernails before looking up; then he saw Ferrel was slipping into his surgeon's whites that had come out on a hanger, and waited until the other was finished. "R's one of the big maybe problems of atomics. Purely theoretical, and none's been made yet—it's either impossible or can't be done in small control batches, safe for testing. That's the trouble, as I said; nobody knows anything about it, except that—if it can exist—it'll break down in a fairly short time into Mahler's Isotope. You've heard of that?"

Doc had—twice. The first had been when Mahler and half his laboratory had disappeared with accompanying noise; he'd been making a comparatively small amount of the new product designed to act as a starter for other reactions. Later, Maicewicz had tackled it on a smaller scale, and that time only two rooms and three men had gone up in dust particles. Five or six years later, atomic theory had been extended to the point where any student could find why the apparently safe product decided to become pure helium and energy in approximately one-billionth of a second.

"How long a time?"

"Half a dozen theories, and no real idea." They'd come out of the washrooms, finished except for their masks. Jenkins ran his elbow into a switch that turned on the ultraviolets that were supposed to sterilize the entire surgery, then looked around questioningly. "What about the supersonics?"

Ferrel kicked them on, shuddering as the bone-shaking harmonic hum indicated their activity. He couldn't complain about the equipment, at least. Ever since the last accident, when the State Congress developed ideas, there'd been enough gadgets lying around to stock up several small hospitals. The supersonics were intended to penetrate through all solids in the room, sterilizing where the UV light couldn't reach. A whistling note in the harmonics reminded him of something that had been tickling around in the back of his mind for minutes.

"There was no emergency whistle, Jenkins. Hardly seems to me they'd neglect that if it were so important."

Jenkins grunted skeptically and eloquently. "I read in the papers a few days ago where Congress

was thinking of moving all atomic plants—meaning National, of course—out into the Mojave Desert. Palmer wouldn't like that. . . . There's the siren again."

Jones, the male attendant, had heard it, and was already running out the fresh stretcher for the litter into the back receiving room. Half a minute later, Beel came trundling in the detachable part of the litter. "Two," he announced. "More coming up as soon as they can get to 'em, Doc."

There was blood spilled over the canvas, and a closer inspection indicated its source in a severed jugular vein, now held in place with a small safety pin that had fastened the two sides of the cut with a series of little pricks around which the blood had clotted enough to stop further loss.

Doc kicked off the supersonics with relief and indicated the man's throat. "Why wasn't I called out instead of having him brought here?"

"Hell, Doc, Palmer said bring 'em in and I brought 'em—I dunno. Guess some guy pinned up this fellow so they figured he could wait. Anything wrong?"

Ferrel grimaced. "With a split jugular, nothing that stops the bleeding's wrong, orthodox or not. How many more, and what's wrong out there?"

"Lord knows, Doc. I only drive 'em, I don't ask questions. So long!" He pushed the new stretcher up on the carriage, went wheeling it out to the small two-wheeled tractor that completed the litter. Ferrel dropped his curiosity back to its proper place and turned to the jugular case, while Dodd adjusted her mask. Jones had their clothes off, swabbed them down hastily, and wheeled them out on operating tables into the center of the surgery.

"Plasma!" A quick examination had shown Doc nothing else wrong with the jugular case, and he made the injection quickly. Apparently the man was only unconscious from shock induced by loss of blood, and the breathing and heart action resumed a more normal course as the liquid filled out the depleted blood vessels. He treated the wound with a sulphonamide derivative in routine procedure, cleaned and sterilized the edges gently, applied clamps carefully, removed the pin, and began stitching with the complicated little motor needle—one of the few gadgets for which he had any real appreciation. A few more drops of blood had spilled, but not seriously, and the wound was now permanently sealed. "Save the pin, Dodd. Goes in the collection. That's all for this. How's the other, Jenkins?"

Jenkins pointed to the back of the man's neck, indicating a tiny bluish object sticking out. "Fragment of steel, clear into the medulla oblongata. No blood loss, but he's been dead since it touched him. Want me to remove it?"

"No need—mortician can do it if they want. . . ."



If these are a sample, I'd guess it as a plain industrial accident, instead of anything connected with radiation."

"You'll get that, too, Doc." It was the jugular case, apparently conscious and normal except for pallor. "We weren't in the converter house. Hey, I'm all right! . . . I'll be—"

Ferrel smiled at the surprise on the fellow's face. "Thought you were dead, eh? Sure, you're all right, if you'll take it easy. A torn jugular either kills you or else it's nothing to worry about. Just pipe down and let the nurse put you to sleep, and you'll never know you got it."

"Lord! Stuff came flying out of the air-intake like bullets out of a machine gun. Just a scratch, I thought; then Jake was bawling like a baby and yelling for a pin. Blood all over the place—then here I am, good as new."

"Uh-huh." Dodd was already wheeling him off to a ward room, her grim face wrinkled into a half-quizzical expression over the mask. "Doctor said to pipe down, didn't he? Well!"

As soon as Dodd vanished, Jenkins sat down, running his hand over his cap; there were little beads of sweat showing where the goggles and mask didn't entirely cover his face. "'Stuff came flying out of the air-intake like bullets out of a machine gun,'" he repeated softly. "Dr. Ferrel,

these two cases were outside the converter—just by-product accidents. Inside—"

"Yeah." Ferrel was picturing things himself, and it wasn't pleasant. Outside, matter tossed through the air ducts; inside— He left it hanging, as Jenkins had. "I'm going to call Blake. We'll probably need him."

II.

"Give me Dr. Blake's residence—Maple 2337," Ferrel said quickly into the phone. The operator looked blank for a second, starting and then checking a purely automatic gesture toward the plugs. "Maple 2337, I said."

"I'm sorry, Dr. Ferrel, I can't give you an outside line. All trunk lines are out of order." There was a constant buzz from the board, but nothing showed in the panel to indicate whether from white inside lights or the red trunk indicators.

"But—this is an emergency, operator. I've got to get in touch with Dr. Blake!"

"Sorry, Dr. Ferrel. All trunk lines are out of order." She started to reach for the plug, but Ferrel stopped her.

"Give me Palmer, then—and no nonsense! If his line's busy, cut me in, and I'll take the responsibility."

"Very good." She snapped at her switches.

"I'm sorry, emergency call from Dr. Ferrel. Hold the line and I'll reconnect you." Then Palmer's face was on the panel, and this time the man was making no attempt to conceal his expression of worry.

"What is it, Ferrel?"

"I want Blake here—I'm going to need him. The operator says—"

"Yeah." Palmer nodded tightly, cutting in. "I've been trying to get him myself, but his house doesn't answer. Any idea of where to reach him?"

"You might try the Bluebird or any of the other night clubs around there." Damn, why did this have to be Blake's celebration night? No telling where he could be found by this time.

Palmer was speaking again. "I've already had all the night clubs and restaurants called, and he doesn't answer. We're paging the movie houses and theaters now—just a second. . . . Nope, he isn't there, Ferrel. Last reports, no response."

"How about sending out a general call over the radio?"

"I'd . . . I'd like to, Ferrel, but it can't be done." The manager had hesitated for a fraction of a second, but his reply was positive. "Oh, by the way, we'll notify your wife you won't be home. Operator! You there? Good, reconnect the Governor!"

There was no sense in arguing into a blank screen, Doc realized. If Palmer wouldn't put through a radio call, he wouldn't, though it had been done once before. "All trunk lines are out of order. . . . We'll notify your wife. . . . Reconnect the Governor!" They weren't even being careful to cover up. He must have repeated the words aloud as he backed out of the office, still staring at the screen, for Jenkins' face twitched into a maladjusted grin.

"So we're cut off. I knew it already; Meyers just got in with more details." He nodded toward the nurse, just coming out of the dressing room and trying to smooth out her uniform. Her almost pretty face was more confused than worried.

"I was just leaving the plant, Dr. Ferrel, when my name came up on the outside speaker, but I had trouble getting here. We're locked in! I saw them at the gate—guards with sticks. They were turning back everyone that tried to leave, and wouldn't tell why, even. Just general orders that no one was to leave until Mr. Palmer gave his permission. And they weren't going to let me back in at first. Do you suppose . . . do you know what it's all about? I heard little things that didn't mean anything, really, but—"

"I know just about as much as you do, Meyers, though Palmer said something about carelessness with one of the ports on No. 3 or 4," Ferrel answered her. "Probably just precautionary measures. Anyway, I wouldn't worry about it yet."

"Yes, Dr. Ferrel." She nodded and turned back

to the front office, but there was no assurance in her look. Doc realized that neither Jenkins nor himself were pictures of confidence at the moment.

"Jenkins," he said, when she was gone, "if you know anything I don't, for the love of Mike, out with it! I've never seen anything like this around here."

Jenkins shook himself, and for the first time since he'd been there, used Ferrel's nickname. "Doc, I don't—that's why I'm in a blue funk. I know just enough to be less sure than you can be, and I'm scared as hell!"

"Let's see your hands." The subject was almost a monomania with Ferrel, and he knew it, but he also knew it wasn't unjustified. Jenkins' hands came out promptly, and there was no tremble to them. The boy threw up his arm so the sleeve slid beyond the elbow, and Ferrel nodded; there was no sweat trickling down from the armpits to reveal a worse case of nerves than showed on the surface. "Good enough, son; I don't care how scared you are—I'm getting that way myself—but with Blake out of the picture, and the other nurses and attendants sure to be out of reach, I'll need everything you've got."

"Doc?"

"Well?"

"If you'll take my word for it, I can get another nurse here—and a good one, too. They don't come any better, or any steadier, and she's not working now. I didn't expect her—well, anyhow, she'd skin me if I didn't call when we need one. Want her?"

"No trunk lines for outside calls," Doc reminded him. It was the first time he'd seen any real enthusiasm on the boy's face, and however good or bad the nurse was, she'd obviously be of value in bucking up Jenkins' spirits. "Go to it, though; right now we can probably use any nurse. Sweet-heart?"

"Wife." Jenkins went toward the dressing room. "And I don't need the phone; we used to carry ultra-short-wave personal radios to keep in touch, and I've still got mine here. And if you're worried about her qualifications, she handed instruments to Bayard at Mayo's for five years—that's how I managed to get through medical school!"

The siren was approaching again when Jenkins came back, the little tense lines about his lips still there, but his whole bearing somehow steadier. He nodded. "I called Palmer, too, and he O. K.'d her coming inside on the phone without wondering how I'd contacted her. The switchboard girl has standing orders to route all calls from us through before anything else, it seems."

Doc nodded, his ear cocked toward the drone of the siren that drew up and finally ended on a sour wheeze. There was a feeling of relief from tension about him as he saw Jones appear and go

toward the rear entrance; work, even under the pressure of an emergency, was always easier than sitting around waiting for it. He saw two stretchers come in, both bearing double loads, and noted that Beel was babbling at the attendant, the driver's usually phlegmatic manner completely gone.

"I'm quitting; I'm through tomorrow! No more watching 'em drag out stiffes for me—not that way. Dunno why I gotta go back, anyhow; it won't do 'em any good to get in further, even if they can. From now on, I'm driving a truck, so help me I am!"

Ferrel let him rave on, only vaguely aware that the man was close to hysteria. He had no time to give to Beel now as he saw the raw red flesh through the visor of one or the armor suits. "Cut off what clothes you can, Jones," he directed. "At least get the shield suits off them. Tannic acid ready, nurse?"

"Ready." Meyers answered together with Jenkins, who was busily helping Jones strip off the heavily armored suits and helmets.

Ferrel kicked on the supersonics again, letting them sterilize the metal suits—there was going to be no chance to be finicky about asepsis; the supersonics and ultra-violet tubes were supposed to take care of that, and they'd have to do it, to a large extent, little as he liked it. Jenkins finished his part, dived back for fresh gloves, with a mere cursory dipping of his hands into antiseptic and rinse. Dodd followed him, while Jones wheeled three of the cases into the middle of the surgery, ready for work; the other had died on the way in.

It was going to be messy work, obviously. Where metal from the suits had touched, or come near touching, the flesh was burned—crisped, rather. And that was merely a minor part of it, as was the more than ample evidence of major radiation burns, which had probably not stopped at the surface, but penetrated through the flesh and bones into the vital interior organs. Much worse, the writhing and spasmodic muscular contractions indicated radioactive matter that had been forced into the flesh and was acting directly on the nerves controlling the motor impulses. Jenkins looked hastily at the twisting body of his case, and his face blanched to a yellowish white; it was the first real example of the full possibilities of an atomic accident he'd seen.

"Curare," he said finally, the word forced out, but level. Meyers handed him the hypodermic and he inserted it, his hand still steady—more than normally steady, in fact, with that absolute lack of movement that can come to a living organism only under the stress of emergency. Ferrel dropped his eyes back to his own case, both relieved and worried.

From the spread of the muscular convulsions, there could be only one explanation—somehow, radioactives had not only worked their way

through the air grills, but had been forced through the almost air-tight joints and sputtered directly into the flesh of the men. Now they were sending out radiations into every nerve, throwing aside the normal orders from the brain and spinal column, setting up anarchic orders of their own that left the muscles to writhe and jerk, one against the other, without order or reason, or any of the normal restraints the body places upon itself. The closest parallel was that of a man undergoing metrozol shock for schizophrenia, or a severe case of strychnine poisoning. He injected curare carefully, metering out the dosage according to the best estimate he could make, but Jenkins had been acting under a pressure that finished the second injection as Doc looked up from his first. Still, in spite of the rapid spread of the drug, some of the twitching went on.

"Curare," Jenkins repeated, and Doc tensed mentally; he'd still been debating whether to risk the extra dosage. But he made no counter-order, feeling slightly relieved this time at having the matter taken out of his hands; Jenkins went back to work, pushing up the injections to the absolute limit of safety, and slightly beyond. One of the cases had started a weird minor moan that hacked on and off as his lungs and vocal cords went in and out of synchronization, but it quieted under the drug, and in a matter of minutes the three lay still, breathing with the shallow flaccidity common to curare treatment. They were still moving slightly, but where before they were perfectly capable of breaking their own bones in uncontrolled efforts, now there was only motion similar to a man with a chill.

"God bless the man who synthesized curare," Jenkins muttered as he began cleaning away damaged flesh, Meyers assisting.

Doc could repeat that; with the older, natural product, true standardization and exact dosage had been next to impossible. Too much, and its action on the body was fatal; the patient died from "exhaustion" of his chest muscles in a matter of minutes. Too little was practically useless. Now that the danger of self-injury and fatal exhaustion from wild exertion was over, he could attend to such relatively unimportant things as the agony still going on—curare had no particular effect on the sensory nerves. He injected neo-heroin and began cleaning the burned areas and treating them with the standard tannic-acid routine, first with a sulphamide to eliminate possible infection, glancing up occasionally at Jenkins.

He had no need to worry, though; the boy's nerves were frozen into an unnatural calm that still pressed through with a speed Ferrel made no attempt to equal, knowing his work would suffer for it. At a gesture, Dodd handed him the little radiation detector, and he began hunting over the skin, inch by inch, for the almost microscopic bits

of matter; there was no hope of finding all now, but the worst deposits could be found and removed; later, with more time, a final probing could be made.

"Jenkins," he asked, "how about I-713's chemical action? Is it basically poisonous to the system?"

"No. Perfectly safe except for radiation. Eight in the outer electron ring, chemically inert."

That, at least, was a relief. Radiations were bad enough in and of themselves, but when coupled with metallic poisoning, like the old radium or mercury poisoning, it was even worse. The small colloiddally fine particles of I-713 in the flesh would set up their own danger signal, and could be scraped away in the worst cases; otherwise, they'd probably have to stay until the isotope exhausted itself. Mercifully, its half life was short, which would decrease the long hospitalization and suffering of the men.

Jenkins joined Ferrel on the last patient, replacing Dodd at handing instruments. Doc would have preferred the nurse, who was used to his little signals, but he said nothing, and was surprised to note the efficiency of the boy's co-operation. "How about the breakdown products?" he asked.

"I-713? Harmless enough, mostly, and what isn't harmless isn't concentrated enough to worry about. That is, if it's still I-713. Otherwise—"

Otherwise, Doc finished mentally, the boy meant there'd be no danger from poisoning, at least. Isotope R, with an uncertain degeneration period, turned into Mahler's Isotope, with a complete breakdown in a billionth of a second. He had a fleeting vision of men, filled with a fine dispersion of that, suddenly erupting over their body with a violence that could never be described; Jenkins must have been thinking the same thing. For a few seconds, they stood there, looking at each other silently, but neither chose to speak of it. Ferrel reached for the probe, Jenkins shrugged, and they went on with their work and their thoughts.

It was a picture impossible to imagine, which they might or might not see; if such an atomic blow-up occurred, what would happen to the laboratory was problematical. No one knew the exact amount Maicewicz had worked on, except that it was the smallest amount he could make, so there could be no good estimate of the damage. The bodies on the operating tables, the little scraps of removed flesh containing the minute globules of radioactive, even the instruments that had come in contact with them, were bombs waiting to explode. Ferrel's own fingers took on some of the steadiness that was frozen in Jenkins as he went about his work, forcing his mind onto the difficult labor at hand.

It might have been minutes or hours later when the last dressing was in place and the three broken

bones of the worst case were set. Meyers and Dodd, along with Jones, were taking care of the men, putting them into the little wards, and the two physicians were alone, carefully avoiding each other's eyes, waiting without knowing exactly what they expected.

Outside, a droning chug came to their ears, and the thump of something heavy moving over the runways. By common impulse they slipped to the side door and looked out, to see the rear end of one of the electric tanks moving away from them. Night had fallen some time before, but the gleaming lights from the big towers around the fence made the plant stand out in glaring detail. Except for the tank moving away, though, other buildings cut off their view.

Then, from the direction of the main gate, a shrill whistle cut the air, and there was a sound of men's voices, though the words were indistinguishable. Sharp, crisp syllables followed, and Jenkins nodded slowly to himself. "Ten'll get you a hundred," he began, "that— Uh, no use betting. It is."

Around the corner a squad of men in State militia uniform marched briskly, bayoneted rifles on their arms. With efficient precision, they spread out under a sergeant's direction, each taking a post before the door of one of the buildings, one approaching the place where Ferrel and Jenkins stood.

"So that's what Palmer was talking to the Governor about," Ferrel muttered. "No use asking them questions, I suppose; they know less than we do. Come on inside where we can sit down and rest. Wonder what good the militia can do here— unless Palmer's afraid someone inside's going to crack and cause trouble."

Jenkins followed him back to the office and accepted a cigarette automatically as he flopped back into a chair. Doc was discovering just how good it felt to give his muscles and nerves a chance to relax, and realizing that they must have been far longer in the surgery than he had thought. "Care for a drink?"

"Uh—is it safe, Doc? We're apt to be back in there any minute."

Ferrel pulled a grin onto his face and nodded. "It won't hurt you—we're just enough on edge and tired for it to be burned up inside for fuel instead of reaching our nerves. Here." It was a generous slug of rye he poured for each, enough to send an almost immediate warmth through them, and to relax their overtensed nerves. "Wonder why Beel hasn't been back long ago?"

"That tank we saw probably explains it; it got too tough for the men to work in just their suits, and they've had to start excavating through the converters with the tanks. Electric, wasn't it, battery powered? . . . So there's enough radiation loose out there to interfere with atomic-powered

machines, then. That means whatever they're doing is tough and slow work. Anyhow, it's more important that they damp the action than get the men out, if they only realize it— Sue!"

Ferrel looked up quickly to see the girl standing there, already dressed for surgery, and he was not too old for a little glow of appreciation to creep over him. No wonder Jenkins' face lighted up. She was small, but her figure was shaped like that of a taller girl, not in the cute or pert lines usually associated with shorter women, and the serious competence of her expression hid none of the loveliness of her face. Obviously she was several years older than Jenkins, but as he stood up to greet her, her face softened and seemed somehow youthful beside the boy's as she looked up.

"You're Dr. Ferrel?" she asked, turning to the older man. "I was a little late—there was some trouble at first about letting me in—so I went directly to prepare before bothering you. And just so you won't be afraid to use me, my credentials are all here."

She put the little bundle on the table, and Ferrel ran through them briefly; it was better than he'd expected. Technically she wasn't a nurse at all, but a doctor of medicine, a so-called nursing doctor; there'd been the need for assistants midway between doctor and nurse for years, having the general training and abilities of both, but only in the last decade had the actual course been created, and the graduates were still limited to a few. He nodded and handed them back.

"We can use you, Dr.—"

"Brown—professional name, Dr. Ferrel. And I'm used to being called just Nurse Brown."

Jenkins cut in on the formalities. "Sue, is there any news outside about what's going on here?"

"Rumors, but they're wild, and I didn't have a chance to hear many. All I know is that they're talking about evacuating the city and everything within fifty miles of here, but it isn't official. And some people were saying the Governor was sending in troops to declare martial law over the whole section, but I didn't see any except here."

Jenkins took her off, then, to show her the Infirmary and introduce her to Jones and the two other nurses, leaving Ferrel to wait for the sound of the siren again, and to try putting two and two together to get sixteen. He attempted to make sense out of the article in the *Weekly Ray*, but gave it up finally; atomic theory had advanced too far since the sketchy studies he'd made, and the symbols were largely without meaning to him. He'd have to rely on Jenkins, it seemed. In the meantime, what was holding up the litter? He should have heard the warning siren long before.

It wasn't the litter that came in next, though, but a group of five men, two carrying a third, and

a fourth supporting the fifth. Jenkins took the carried man over, Brown helping him; it was similar to the former cases, but without the actual burns from contact with hot metal. Ferrel turned to the men.

"Where's Beel and the litter?" He was inspecting the supported man's leg as he asked, and began work on it without moving the fellow to a table. Apparently a lump of radioactive matter the size of a small pea had been driven half an inch into the flesh below the thigh, and the broken bone was the result of the violent contractions of the man's own muscles under the stimulus of the radiation. It wasn't pretty. Now, however, the strength of the action had apparently burned out the nerves around, so the leg was comparatively limp and without feeling; the man lay watching, relaxed on the bench in a half-comatose condition, his eyes popping out and his lips twisted into a sick grimace, but he did not flinch as the wound was scraped out. Ferrel was working around a small leaden shield, his arms covered with heavily leaded gloves, and he dropped the scraps of flesh and isotope into a box of the same metal.

"Beel—he's out of this world, Doc," one of the others answered when he could tear his eyes off the probing. "He got himself blotto, somehow, and wrecked the litter before he got back. Couldn't take it, watching us grapple 'em out—and we hadda go in after 'em without a drop of hootch!"

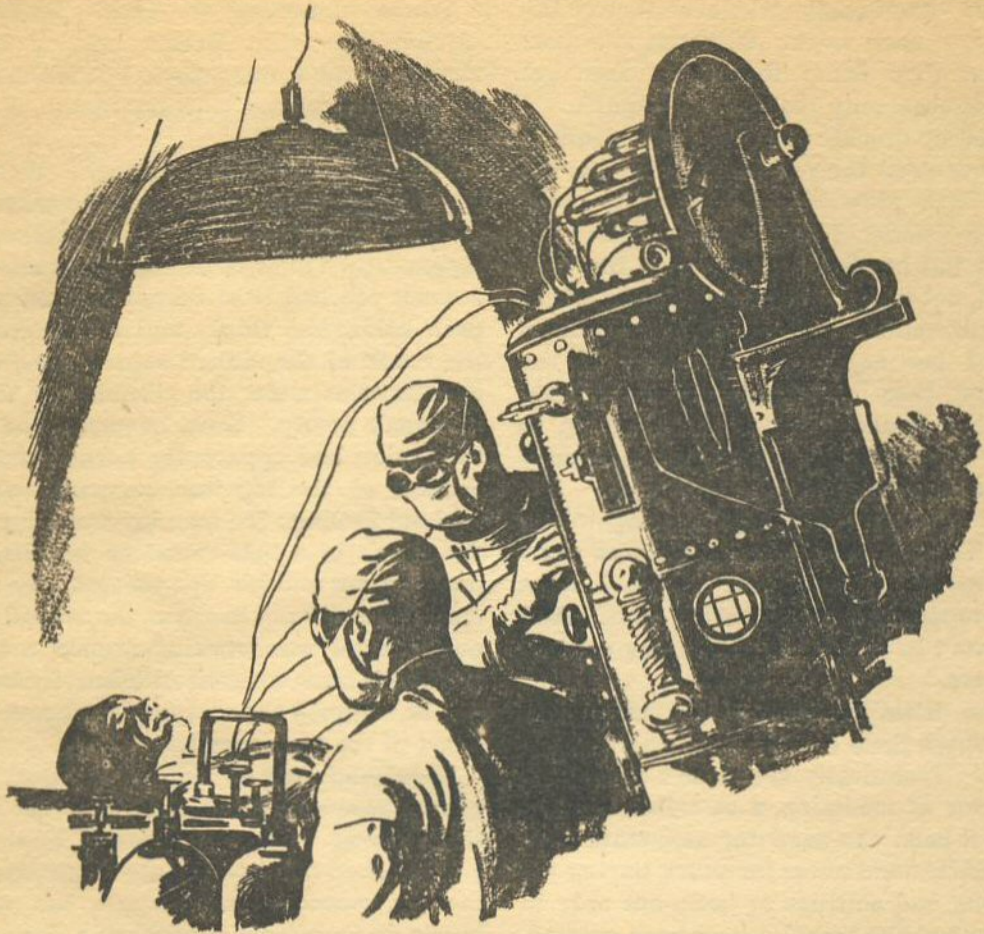
Ferrel glanced at him quickly, noticing Jenkins' head jerk around as he did so. "You were getting them out? You mean you didn't come from in there?"

"Heck, no, Doc. Do we look that bad? Them two got it when the stuff decided to spit on 'em clean through their armor. Me, I got me some nice burns, but I ain't complaining—I got a look at a couple of stiffs, so I'm kicking about nothing!"

Ferrel hadn't noticed the three who had traveled under their own power, but he looked now, carefully. They were burned, and badly, by radiations, but the burns were still new enough not to give them too much trouble, and probably what they'd just been through had temporarily deadened their awareness of pain, just as a soldier on the battlefield may be wounded and not realize it until the action stops. Anyway, atomjacks were not noted for sissiness.

"There's almost a quart in the office there on the table," he told them. "One good drink apiece—no more. Then go up front and I'll send Nurse Brown in to fix up your burns as well as can be for now." Brown could apply the unguents developed to heal radiation burns as well as he could, and some division of work that would relieve Jenkins and himself seemed necessary. "Any chance of finding any more living men in the converter housings?"

"Maybe. Somebody said the thing let out a



groan half a minute before it popped, so most of 'em had a chance to duck into the two safety chambers. Figure on going back there and pushing tanks ourselves unless you say no; about half an hour's work left before we can crack the chambers, I guess, then we'll know."

"Good. And there's no sense in sending in every man with a burn, or we'll be flooded here; they can wait, and it looks as if we'll have plenty of serious stuff to care for. Dr. Brown, I guess you're elected to go out with the men—have one of them drive the spare litter Jones will show you. Salve down all the burn cases, put the worst ones off duty, and just send in the ones with the jerks. You'll find my emergency kit in the office, there. Someone has to be out there to give first aid and sort them out—we haven't room for the whole plant in here."

"Right, Dr. Ferrel." She let Meyers replace her in assisting Jenkins, and was gone briefly to come out with his bag. "Come on, you men. I'll hop the litter and dress down your burns on the way. You're appointed driver, mister. Somebody should have reported that Beel person before, so the litter would be out there now."

The spokesman for the others upended the glass he'd filled, swallowed, gulped, and grinned down at her. "O. K., doctor, only out there you ain't got time to think—you gotta do. Thanks for the shot,

Doc, and I'll tell Hoke you're appointing her out there."

They filed out behind Brown as Jones went out to get the second litter, and Doc went ahead with the quick-setting plastic cast for the broken leg. Too bad there weren't more of those nursing doctors; he'd have to see Palmer about it after this was over—if Palmer and he were still around. Wonder how the men in the safety chambers, about which he'd completely forgotten, would make out? There were two in each converter housing, designed as an escape for the men in case of accident, and supposed to be proof against almost anything. If the men had reached them, maybe they were all right; he wouldn't have taken a bet on it, though. With a slight shrug, he finished his work and went over to help Jenkins.

The boy nodded down at the body on the table, already showing extensive scraping and probing. "Quite a bit of spitting clean through the armor," he commented. "Those words were just a little too graphic for me. I-713 couldn't do that."

"Hm-m-m." Doc was in no mood to quibble on the subject. He caught himself looking at the little box in which the stuff was put after they worked what they could out of the flesh, and jerked his eyes away quickly. Whenever the lid was being dropped, a glow could be seen inside. Jenkins al-

ways managed to keep his eyes on something else.

They were almost finished when the switchboard girl announced a call, and they waited to make the few last touches before answering, then filed into the office together. Brown's face was on the screen, smudged and with a spot of rouge standing out on each cheek. Another smudge appeared as she brushed the auburn hair out of her eyes with the back of her wrist.

"They've cracked the converter safety chambers, Dr. Ferrel. The north one held up perfectly, except for the heat and a little burn, but something happened in the other; oxygen valve stuck, and all are unconscious, but alive. Magma must have sprayed through the door, because sixteen or seventeen have the jerks, and about a dozen are dead. Some others need more care than I can give—I'm having Hokusai delegate men to carry those the stretchers won't hold, and they're all piling up on you in a bunch right now!"

Ferrel grunted and nodded. "Could have been worse, I guess. Don't kill yourself out there, Brown."

"Same to you." She blew Jenkins a kiss and snapped off, just as the whine of the litter siren reached their ears.

In the surgery again, they could see a truck showing behind it, and men lifting out bodies in apparently endless succession.

"Get their armor off, somehow, Jones—grab anyone else to help you that you can. Curare, Dodd, and keep handing it to me. We'll worry about everything else after Jenkins and I quiet them." This was obviously going to be a mass-production sort of business, not for efficiency, but through sheer necessity. And again, Jenkins with his queer taut steadiness was doing two for one that Doc could do, his face pale and his eyes almost glazed, but his hands moving endlessly and nervelessly on with his work.

Sometime during the night Jenkins looked up at Meyers, and motioned her back. "Go get some sleep, nurse; Miss Dodd can take care of both Dr. Ferrel and myself when we work close together. Your nerves are shot, and you need the rest. Dodd, you can call her back in two hours and rest yourself."

"What about you, doctor?"

"Me—" He grinned out of the corner of his mouth, crookedly. "I've got an imagination that won't sleep, and I'm needed here." The sentence ended on a rising inflection that was false to Ferrel's ear, and the older doctor looked at the boy thoughtfully.

Jenkins caught his look. "It's O. K., Doc; I'll let you know when I'm going to crack. It was O. K. to send Meyers back, wasn't it?"

"You were closer to her than I was, so you should know better than I." Technically, the nurses were all directly under his control, but

they'd dropped such technicalities long before. Ferrel rubbed the small of his back briefly, then picked up his scalpel again.

A faint gray light was showing in the east, and the wards had overflowed into the waiting room when the last case from the chambers was finished as best he could be. During the night, the converter had continued to spit occasionally, even through the tank armor twice, but now there was a temporary lull in the arrival of workers for treatment. Doc sent Jones after breakfast from the cafeteria, then headed into the office where Jenkins was already slumped down in the old leather chair.

The boy was exhausted almost to the limit from the combined strain of the work and his own suppressed jitters, but he looked up in mild surprise as he felt the prick of the needle. Ferrel finished it, and used it on himself before explaining. "Morphine, of course. What else can we do? Just enough to keep us going, but without it we'll both be useless out there in a few more hours. Anyhow, there isn't as much reason not to use it as there was when I was younger, before the counter-agent was discovered to kill most of its habit-forming tendency. Even five years ago, before they had that, there were times when morphine was useful, Lord knows, though anyone who used it except as a last resort deserved all the hell he got. A real substitute for sleep would be better, though; wish they'd finish up the work they're doing on that fatigue eliminator at Harvard. Here, eat that!"

Jenkins grimaced at the breakfast Jones laid out in front of him, but he knew as well as Doc that the food was necessary, and he pulled the plate back to him. "What I'd give an eye tooth for, Doc, wouldn't be a substitute—just half an hour of good old-fashioned sleep. Only, damn it, if I knew I had time, I couldn't do it—not with R out there bubbling away."

The telephone annunciator clipped in before Doc could answer. "Telephone for Dr. Ferrel; emergency! Dr. Brown calling Dr. Ferrel!"

"Ferrel answering!" The phone girl's face popped off the screen, and a tired-faced Sue Brown looked out at them. "What is it?"

"It's that little Japanese fellow—Hokusai—who's been running things out here, Dr. Ferrel. I'm bringing him in with an acute case of appendicitis. Prepare surgery!"

Jenkins gagged over the coffee he was trying to swallow, and his choking voice was halfway between disgust and hysterical laughter. "Appendicitis, Doc! My God, what comes next?"

III.

It might have been worse. Brown had coupled in the little freezing unit on the litter and lowered

the temperature around the abdomen, both preparing Hokusai for surgery and slowing down the progress of the infection so that the appendix was still unbroken when he was wheeled into the surgery. His seamed Oriental face had a grayish cast under the olive, but he managed a faint grin.

"Verry ssorry, Dr. Ferrel, to bother you. Verry ssorry. No ether, please!"

Ferrel grunted. "No need of it, Hoke; we'll use hypothermy, since it's already begun. Over here, Jones. . . And you might as well go back and sit down, Jenkins."

Brown was washing, and popped out again, ready to assist with the operation. "He had to be tied down, practically, Dr. Ferrel. Insisted that he only needed a little mineral oil and some peppermint for his stomach-ache! Why are intelligent people always the most stupid?"

It was a mystery to Ferrel, too, but seemingly the case. He tested the temperature quickly while the surgery hypothermy equipment began functioning, found it low enough, and began. Hoke flinched with his eyes as the scalpel touched him, then opened them in mild surprise at feeling no appreciable pain. The complete absence of nerve response with its accompanying freedom from post-operative shock was one of the great advantages of low-temperature work in surgery. Ferrel laid back the flesh, severed the appendix quickly, and removed it through the tiny incision. Then, with one of the numerous attachments, he made use of the ingenious mechanical stitcher and stepped back.

"All finished, Hoke, and you're lucky you didn't rupture—peritonitis isn't funny, even though we can cut down on it with the sulphenamides. The ward's full, so's the waiting room, so you'll have to stay on the table for a few hours until we can find a place for you; no pretty nurse, either—until the two other girls get here sometime this morning. I dunno what we'll do about the patients."

"But, Dr. Ferrel, I am hear that now ssurgery—I sshould be up, already. There iss work I am do."

"You've been hearing that appendectomy patients aren't confined now, eh? Well, that's partly true. Johns-Hopkins began it quite awhile ago. But for the next hour, while the temperature comes back to normal, you stay put. After that, if you want to move around a little, you can; but no going out to the converter. A little exercise probably helps more than it harms, but any strain wouldn't be good."

"But, the danger—"

"Be hanged, Hoke. You couldn't help now, long enough to do any good. Until the stuff in those stitches dissolves away completely in the body fluids, you're to take it easy—and that's two weeks, about."

The little man gave in, reluctantly. "Then I

think I ssleep now. But besst you sshould call Mr. Palmer at once, please! He musst know I am not there!"

Palmer took the news the hard way, with an unfair but natural tendency to blame Hokusai and Ferrel. "Damn it, Doc, I was hoping he'd get things straightened out somehow—I practically promised the Governor that Hoke could take care of it; he's got one of the best brains in the business. Now this! Well, no help, I guess. He certainly can't do it unless he's in condition to get right into things. Maybe Jorgenson, though, knows enough about it to handle it from a wheel chair, or something. How's he coming along—in shape to be taken out where he can give directions to the foremen?"

"Wait a minute." Ferrel stopped him as quickly as he could. "Jorgenson isn't here. We've got thirty-one men lying around, and he isn't one of them; and if he'd been one of the seventeen dead, you'd know it. I didn't know Jorgenson was working, even."

"He had to be—it was his process! Look, Ferrel, I was distinctly told that he was taken to you—foreman dumped him on the litter himself and reported at once! Better check up, and quick—with Hoke only half able, I've got to have Jorgenson!"

"He isn't here—I know Jorgenson. The foreman must have mistaken the big fellow from the south safety for him, but that man had black hair inside his helmet. What about the three hundred-odd that were only unconscious, or the fifteen-sixteen hundred men outside the converter when it happened?"

Palmer wiggled his jaw muscles tensely. "Jorgenson would have reported or been reported fifty times. Every man out there wants him around to boss things. He's gotta be in your ward."

"He isn't, I tell you! And how about moving some of the fellows here into the city hospitals?"

"Tried—hospitals must have been tipped off somehow about the radioactives in the flesh, and they refuse to let a man from here be brought in." Palmer was talking with only the surface of his mind, his cheek muscles bobbing as if he were chewing his thoughts and finding them tough. "Jorgenson—Hoke—and Kellar's been dead for years. Not another man in the whole country that understands this field enough to make a decent guess, even; I get lost on Page 6 myself. Ferrel, could a man in a Tomlin five-shield armor suit make the safety in twenty seconds, do you think, from—say beside the converter?"

Ferrel considered it rapidly. A Tomlin weighed about four hundred pounds, and Jorgenson was an ox of a man, but only human. "Under the stress of an emergency, it's impossible to guess what a man can do, Palmer, but I don't see how he could work his way half that distance."

"Hm-m-m, I figured. Could he live, then, supposing he wasn't squashed? Those suits carry their own air for twenty-four hours, you know, to avoid any air cracks, pumping the carbon-dioxide back under pressure and condensing the moisture out—no openings of any kind. They've got the best insulation of all kinds we know, too."

"One chance in a billion, I'd guess; but again, it's darned hard to put any exact limit on what can be done—miracles keep happening, every day. Going to try it?"

"What else can I do? There's no alternative. I'll meet you outside No. 4 just as soon as you can make it, and bring everything you need to start working at once. Seconds may count!" Palmer's face slid sideways and up as he was reaching for the button, and Ferrel wasted no time in imitating the motion.

By all logic, there wasn't a chance, even in a Tomlin. But, until they knew, the effort would have to be made; chances couldn't be taken when a complicated process had gone out of control, with now almost certainty that Isotope R was the result—Palmer was concealing nothing, even though he had stated nothing specifically. And obviously, if Hoke couldn't handle it, none of the men at other branches of National Atomic or at the smaller partially independent plants could make even a half-hearted stab at the job.

It all rested on Jorgenson, then. And Jorgenson must be somewhere under that semimolten hell that could drive through the tank armor and send men back into the Infirmary with bones broken from their own muscular anarchy!

Ferrel's face must have shown his thoughts, judging by Jenkins' startled expression. "Jorgenson's still in there somewhere," he said quickly.

"Jorgenson! But he's the man who— Good Lord!"

"Exactly. You'll stay here and take care of the jerk cases that may come in. Brown, I'll want you out there again. Bring everything portable we have, in case we can't move him in fast enough; get one of the trucks and fit it out; and be out with it about twice as fast as you can! I'm grabbing the litter now." He accepted the emergency kit Brown thrust into his hands, dumped a caffeine tablet into his mouth without bothering to wash it down, then was out toward the litter. "No. 4, and hurry!"

Palmer was just jumping off a scooter as they cut around No. 3 and in front of the rough fence of rope strung out quite a distance beyond 4. He glanced at Doc, nodded, and dived in through the men grouped around, yelling orders to right and left as he went, and was back at Ferrel's side by the time the litter had stopped.

"O. K., Ferrel, go over there and get into armor as quickly as possible! We're going in there with

the tanks, whether we can or not, and be damned to the quenching for the moment. Briggs, get those things out of there, clean out a roadway as best you can, throw in the big crane again, and we'll need all the men in armor we can get—give them steel rods and get them to probing in there for anything solid and big or small enough to be a man—five minutes at a stretch; they should be able to stand that. I'll be back pronto!"

Doc noted the confused mixture of tanks and machines of all descriptions clustered around the walls—or what was left of them—of the converter housing, and saw them yanking out everything along one side, leaving an opening where the main housing gate had stood, now ripped out to expose a crane boom rooting out the worst obstructions. Obviously they'd been busy at some kind of attempt at quenching the action, but his knowledge of atomics was too little even to guess at what it was. The equipment set up was being pushed aside by tanks without dismantling, and men were running up into the roped-in section, some already armored, others dragging on part of their armor as they went. With the help of one of the atom-jacks, he climbed into a suit himself, wondering what he could do in such a casing if anything needed doing.

Palmer had a suit on before him, though, and was waiting beside one of the tanks, squat and heavily armored, its front equipped with both a shovel and a grapple swinging from movable beams. "In here, Doc." Ferrel followed him into the housing of the machine and Palmer grabbed the controls as he pulled on a short-wave headset and began shouting orders through it toward the other tanks that were moving in on their heavy treads. The dull drone of the motor picked up, and the tank began lumbering forward under the manager's direction.

"Haven't run one of these since that show-off at a picnic seven years ago," he complained, as he kicked at the controls and straightened out a developing list to left. "Though I used to be pretty handy when I was plain engineer. Damned static around here almost chokes off the radio, but I guess enough gets through. By the best guess I can make, Jorgenson should have been near the main control panel when it started, and have headed for the south chamber. Half the distance, you figure?"

"Possibly, probably slightly less."

"Yeah! And then the stuff may have tossed him around. But we'll have to try to get there." He barked into the radio again. "Briggs, get those men in suits as close as you can and have them fish with their rods about thirty feet to the left of the pillar that's still up—can they get closer?"

The answer was blurred and pieces missing, but the general idea went across. Palmer frowned. "O. K., if they can't make it, they can't; draw

them back out of the reach of the stuff and hold them ready to go in. . . . No, call for volunteers! I'm offering a thousand dollars a minute to every man that gets a stick in there, double to his family if the stuff gets him, and ten times that—fifty thousand—if he locates Jorgenson! . . . Look out, you blamed fool!" The last was to one of the men who'd started forward, toward the place, jumping from one piece of broken building to grab at a pillar and swing off in his suit toward something that looked like a standing position; it toppled, but he managed a leap that carried him to another lump, steadied himself, and began probing through the mess. "Oof! You with the crane—stick it in where you can grab any of the men that pass out, if it'll reach—good! Doc, I know as well as you that the men have no business in there, even five minutes; but I'll send in a hundred more if it'll find Jorgenson!"

Doc said nothing—he knew there'd probably be a hundred or more fools willing to try, and he knew the need of them. The tanks couldn't work their way close enough for any careful investigation of the mixed mass of radioactives, machinery, building, debris, and destruction, aside from which they were much too slow in such delicate probing; only men equipped with the long steel poles could do that. As he watched, some of the activity of the magma suddenly caused an eruption, and one of the men tossed up his pole and doubled back into a half circle before falling. The crane operator shoved the big boom over and made a grab, missed, brought it down again, and came out with the heaving body held by one arm, to run it back along its track and twist it outward beyond Doc's vision.

Even through the tank and the suit, heat was pouring in, and there was a faint itching in those parts where the armor was thinnest that indicated the start of a burn—though not as yet dangerous. He had no desire to think what was happening to the men who were trying to worm into the heart of it in nothing but armor; nor did he care to watch what was happening to them. Palmer was trying to inch the machine ahead, but the stuff underneath made any progress difficult. Twice something spat against the tank, but did not penetrate.

"Five minutes are up," he told Palmer. "They'd all better go directly to Dr. Brown, who should be out with the truck now for immediate treatment."

Palmer nodded and relayed the instructions. "Pick up all you can with the crane and carry them back! Send in a new bunch, Briggs, and credit them with their bonus in advance. Damn it, Doc, this can go on all day; it'll take an hour to pry around through this mess right here, and then he's probably somewhere else. The stuff

seems to be getting worse in this neighborhood, too, from what accounts I've had before. Wonder if that steel plate could be pushed down?"

He threw in the clutch engaging the motor to the treads and managed to twist through toward it. There was a slight slipping of the lugs, then the tractors caught, and the nose of the tank thrust forward; almost without effort, the fragment of housing toppled from its leaning position and slid forward. The tank growled, fumbled, and slowly climbed up onto it and ran forward another twenty feet to its end; the support settled slowly, but something underneath checked it, and they were still again. Palmer worked the grapple forward, nosing a big piece of masonry out of the way, and two men reached out with the ends of their poles to begin probing, futilely. Another change of men came out, then another.

Briggs' voice crackled erratically through the speaker again. "Palmer, I got a fool here who wants to go out on the end of your beam, if you can swing around so the crane can lift him out to it."

"Start him coming!" Again he began jerking the levers, and the tank bucked and heaved, backed and turned, ran forward, and repeated it all, while the plate that was holding them flopped up and down on its precarious balance.

Doc held his breath and began praying to himself; his admiration for the men who'd go out in that stuff was increasing by leaps and bounds, along with his respect for Palmer's ability.

The crane boom bobbed toward them, and the scoop came running out, but wouldn't quite reach; their own tank was relatively light and mobile compared to the bigger machine, but Palmer already had that pushed out to the limit, and hanging over the edge of the plate. It still lacked three feet of reaching.

"Damn!" Palmer slapped open the door of the tank, jumped forward on the tread, and looked down briefly before coming back inside. "No chance to get closer! Wheeoo! Those men earn their money."

But the crane operator had his own tricks, and was bobbing the boom of his machine up and down slowly with a motion that set the scoop swinging like a huge pendulum, bringing it gradually closer to the grapple beam. The man had an arm out, and finally caught the beam, swinging out instantly from the scoop that drew backward behind him. He hung suspended for a second, pitching his body around to a better position, then somehow wiggled up onto the end and braced himself with his legs. Doc let his breath out and Palmer inched the tank around to a forward position again. Now the pole of the atomjack could cover the wide territory before them, and he began using it rapidly.



"Win or lose, that man gets a triple bonus," Palmer muttered. "Uh!"

The pole had located something, and was feeling around to determine size; the man glanced at them and pointed frantically. Doc jumped forward to the windows as Palmer ran down the grapple and began pushing it down into the semi-molten stuff under the pole; there was resistance there, but finally the prong of the grapple broke under and struck on something that refused to come up. The manager's hands moved the controls gently, making it tug from side to side; reluctantly, it gave and moved forward toward them, coming upward until they could make out the general shape. It was definitely no Tomlin suit!

"Lead hopper box! Damn— Wait, Jorgenson wasn't anybody's fool; when he saw he couldn't make the safety, he might . . . maybe—" Palmer slapped the grapple down again, against the closed lid of the chest, but the hook was too large. Then the man clinging there caught the idea and slid down to the hopper chest, his armored hands grabbing at the lid. He managed to lift a corner of it until the grapple could catch and lift it the

rest of the way, and his hands started down to jerk upward again.

The manager watched his motions, then flipped the box over with the grapple, and pulled it closer to the tank body; magma was running out, but there was a gleam of something else inside.

"Start praying, Doc!" Palmer worked it to the side of the tank and was out through the door again, letting the merciless heat and radiation stream in.

But Ferrel wasn't bothering with that now; he followed, reaching down into the chest to help the other two lift out the body of a huge man in a five-shield Tomlin! Somehow, they wangled the six-hundred-odd pounds out and up on the treads, then into the housing, barely big enough for all of them. The atomjack pulled himself inside, shut the door, and flopped forward on his face, out cold.

"Never mind him—check Jorgenson!" Palmer's voice was heavy with the reaction from the hunt, but he turned the tank and sent it outward at top speed, regardless of risk. Contrarily, it bucked through the mass more readily than it had crawled in through the cleared section.

Ferrel unscrewed the front plate of the armor

on Jorgenson as rapidly as he could, though he knew already that the man was still miraculously alive—corpses don't jerk with force enough to move a four-hundred-pound suit appreciably. A side glance, as they drew beyond the wreck of the converter housing, showed the men already beginning to set up equipment to quell the atomic reaction again, but the armor front plate came loose at last, and he dropped his eyes back without noticing details, to cut out a section of clothing and make the needed injections; curare first, then neo-heroin, and curare again, though he did not dare inject the quantity that seemed necessary. There was nothing more he could do until they could get the man out of his armor. He turned to the atomjack, who was already sitting up, propped against the driving seat's back.

"Snothing much, Doc," the fellow managed. "No jerks, just burn and that damned heat! Jorgenson?"

"Alive at least," Palmer answered, with some relief. The tank stopped, and Ferrel could see Brown running forward from beside a truck. "Get that suit off you, get yourself treated for the burn, then go up to the office where the check will be ready for you!"

"Fifty-thousand check?" The doubt in the voice registered over the weakness.

"Fifty thousand plus triple your minute time, and cheap; maybe we'll toss in a medal or a bottle of Scotch, too. Here, you fellows give a hand."

Ferrel had the suit ripped off with Brown's assistance, and paused only long enough for one grateful breath of clean, cool air before leading the way toward the truck. As he neared it, Jenkins popped out, directing a group of men to move two loaded stretchers onto the litter, and nodding jerkily at Ferrel. "With the truck all equipped, we decided to move out here and take care of the damage as it came up— Sue and I rushed them through enough to do until we can find more time, so we could give full attention to Jorgenson. He's still living!"

"By a miracle. Stay out here, Brown, until you've finished with the men from inside, then we'll try to find some rest for you."

The three huskies carrying Jorgenson placed the body on the table set up, and began ripping off the bulky armor as the truck got under way. Fresh gloves came out of a small sterilizer, and the two doctors fell to work at once, treating the badly burned flesh and trying to locate and remove the worst of the radioactive matter.

"No use." Doc stepped back and shook his head. "It's all over him, probably clear into his bones in places. We'd have to put him through a filter to get it all out!"

Palmer was looking down at the raw mass of flesh, with all the layman's sickness at such a sight. "Can you fix him up, Ferrel?"

"We can try, that's all. Only explanation I can give for his being alive at all is that the hopper box must have been pretty well above the stuff until a short time ago—very short—and this stuff didn't work in until it sank. He's practically dehydrated now, apparently, but he couldn't have perspired enough to keep from dying of heat if he'd been under all that for even an hour—insulation or no insulation." There was admiration in Doc's eyes as he looked down at the immense figure of the man. "And he's tough; if he weren't, he'd have killed himself by exhaustion, even confined inside that suit and box, after the jerks set in. He's close to having done so, anyway. Until we can find some way of getting that stuff out of him, we don't dare risk getting rid of the curare's effect—that's a time-consuming job, in itself. Better give him another water and sugar intravenous, Jenkins. Then, if we do fix him up, Palmer, I'd say it's a fifty-fifty chance whether or not all this hasn't driven him stark crazy."

The truck had stopped, and the men lifted the stretcher off and carried it inside as Jenkins finished the injection. He went ahead of them, but Doc stopped outside to take Palmer's cigarette for a long drag, and let them go ahead.

"Cheerful!" The manager lighted another from the butt, his shoulders sagging. "I've been trying to think of one man who might possibly be of some help to us, Doc, and there isn't such a person—anywhere. I'm sure now, after being in there, that Hoke couldn't do it. Kellar, if he were still alive, could probably pull the answer out of a hat after three looks—he had an instinct and genius for it; the best man the business ever had, even if his tricks did threaten to steal our work out from under us and give him the lead. But—well, now there's Jorgenson—either he gets in shape, or else!"

Jenkins' frantic yell reached them suddenly. "Doc! Jorgenson's dead! He's stopped breathing entirely!"

Doc jerked forward into a full run, a white-faced Palmer at his heels.

IV.

Dodd was working artificial respiration and Jenkins had the oxygen mask in his hands, adjusting it over Jorgenson's face, before Ferrel reached the table. He made a grab for the pulse that had been fluttering weakly enough before, felt it flicker feebly once, pause for about three times normal period, lift feebly again, and then stop completely. "Adrenalin!"

"Already shot it into his heart, Doc! Cardiacine, too!" The boy's voice was bordering on hysteria, but Palmer was obviously closer to it than Jenkins.

"Doc, you gotta—"

"Get the hell out of here!" Ferrel's hands suddenly had a life of their own as he grabbed frantically for instruments, ripped bandages off the man's chest, and began working against time, when time had all the advantages. It wasn't surgery—hardly good butchery; the bones that he cut through so ruthlessly with savage strokes of an instrument could never heal smoothly after being so mangled. But he couldn't worry about minor details now.

He tossed back the flap of flesh and ribs that he'd hacked out. "Stop the bleeding, Jenkins!" Then his hands plunged into the chest cavity, somehow finding room around Dodd's and Jenkins,' and were suddenly incredibly gentle as they located the heart itself and began working on it, the skilled, exact massage of a man who knew every function of the vital organ. Pressure here, there, relax, pressure again; take it easy, don't rush things! It would do no good to try to set it going as feverishly as his emotions demanded. Pure oxygen was feeding into the lungs, and the heart could safely do less work. Hold it steady, one beat a second, sixty a minute.

It had been perhaps half a minute from the time the heart stopped before his massage was circulating blood again; too little time to worry about damage to the brain, the first part to be permanently affected by stoppage of the circulation. Now, if the heart could start again by itself within any reasonable time, death would be cheated again. How long? He had no idea. They'd taught him ten minutes when he was studying medicine, then there'd been a case of twenty minutes once, and while he was interning it had been pushed up to a record of slightly over an hour, which still stood; but that was an exceptional case. Jorgenson, praise be, was a normally healthy and vigorous specimen, and his system had been in first-class condition, but with the torture of those long hours, the radioactive, narcotic and curare all fighting against him, still one more miracle was needed to keep his life going.

Press, message, relax, don't hurry it too much. There! For a second, his fingers felt a faint flutter, then again; but it stopped. Still, as long as the organ could show such signs, there was hope, unless his fingers grew too tired and he muffed the job before the moment when the heart could be safely trusted by itself.

"Jenkins!"

"Yes, sir!"

"Ever do any heart massage?"

"Practiced it in school, sir, on a model, but never actually. Oh, a dog in dissection class, for five minutes. I . . . I don't think you'd better trust me, Doc."

"I may have to. If you did it on a dog for five minutes, you can do it on a man, probably. You

know what hangs on it—you saw the converter and know what's going on."

Jenkins nodded, the tense nod he'd used earlier. "I know—that's why you can't trust me. I told you I'd let you know when I was going to crack—well, it's damned near here!"

Could a man tell his weakness, if he were about finished? Doc didn't know; he suspected that the boy's own awareness of his nerves would speed up such a break, if anything, but Jenkins was a queer case, having taut nerves sticking out all over him, yet a steadiness under fire that few older men could have equaled. If he had to use him, he would; there was no other answer.

Doc's fingers were already feeling stiff—not yet tired, but showing signs of becoming so. Another few minutes, and he'd have to stop. There was the flutter again, one—two—three! Then it stopped. There had to be some other solution to this; it was impossible to keep it up for the length of time probably needed, even if he and Jenkins spelled each other. Only Michel at Mayo's could—Mayo's! If they could get it here in time, that wrinkle he'd seen demonstrated at their last medical convention was the answer.

"Jenkins, call Mayo's—you'll have to get Palmer's O. K., I guess—ask for Kubelik, and bring the extension where I can talk to him!"

He could hear Jenkins' voice, level enough at first, then with a depth of feeling he'd have thought impossible in the boy. Dodd looked at him quickly and managed a grim smile, even as she continued with the respiration; nothing could make her blush, though it should have done so.

The boy jumped back. "No soap, Doc! Palmer can't be located—and that post-mortem misconception at the board won't listen."

Doc studied his hands in silence, wondering, then gave it up; there'd be no hope of his lasting while he sent out the boy. "O. K., Jenkins, you'll have to take over here, then. Steady does it, come on in slowly, get your fingers over mine. Now, catch the motion? Easy, don't rush things. You'll hold out—you'll have to! You've done better than I had any right to ask for so far, and you don't need to distrust yourself. There, got it?"

"Got it, Doc. I'll try, but for Pete's sake, whatever you're planning, get back here quick! I'm not lying about cracking! You'd better let Meyers replace Dodd and have Sue called back in here; she's the best nerve tonic I know."

"Call her in then, Dodd." Doc picked up a hypodermic syringe, filled it quickly with water to which a drop of another liquid added a brownish-yellow color, and forced his tired old legs into a reasonably rapid trot out of the side door and toward Communications. Maybe the switchboard operator was stubborn, but there were ways of handling people.

He hadn't counted on the guard outside the Communications Building, though. "Halt!"

"Life or death; I'm a physician."

"Not in here—I got orders." The bayonet's menace apparently wasn't enough; the rifle went up to the man's shoulder, and his chin jutted out with the stubbornness of petty authority and reliance on orders. "Nobody sick here. There's plenty of phones elsewhere. You get back—and fast!"

Doc started forward and there was a faint click from the rifle as the safety went off; the darned fool meant what he said. Shrugging, Ferrel stepped back—and brought the hypodermic needle up inconspicuously in line with the guard's face. "Ever see one of these things squirt curare? It can reach before your bullet hits!"

"Curare?" The guard's eyes flicked to the needle, and doubt came into them. The man frowned. "That's the stuff that kills people on arrows, ain't it?"

"It is—cobra venom, you know. One drop on the outside of your skin and you're dead in ten seconds." Both statements were out-and-out lies, but Doc was counting on the superstitious ignorance of the average man in connection with poisons. "This little needle can spray you with it very nicely, and it may be a fast death, but not a pleasant one. Want to put down the rifle?"

A regular might have shot; but the militiaman was taking no chances. He lowered the rifle gingerly, his eyes on the needle, then kicked the weapon aside at Doc's motion. Ferrel approached, holding the needle out, and the man shrank backward and away, letting him pick up the rifle as he went past to avoid being shot in the back. Lost time! But he knew his way around this little building, at least, and went straight toward the girl at the board.

"Get up!" His voice came from behind her shoulder and she turned to see the rifle in one of his hands, the needle in the other, almost touching her throat. "This is loaded with curare, deadly poison, and too much hangs on getting a call through to bother with physician's oaths right now, young lady. Up! No plugs! That's right; now get over there, out of the cell—there, on your face, cross your hands behind your back, and grab your ankles—right! Now if you move, you won't move long!"

Those gangster pictures he'd seen were handy, at that. She was thoroughly frightened and docile. But, perhaps, not so much so she might not have bungled his call deliberately. He had to do that himself. Darn it, the red lights were trunk lines, but which plug—try the inside one, it looked more logical; he'd seen it done, but couldn't remember. Now, you flip back one of these switches—uh-uh, the other way. The tone came in assuring him he had it right, and he dialed operator rapidly,

his eyes flickering toward the girl lying on the floor, his thoughts on Jenkins and the wasted time running on.

"Operator, this is an emergency. I'm Walnut, 7654; I want to put in a long-distance call to Dr. Kubelik, Mayo's Hospital, Rochester, Minnesota. If Kubelik isn't there, I'll take anyone else who answers from his department. Speed is urgent."

"Very good, sir." Long-distance operators, mercifully, were usually efficient. There was the repeated signals and clicks of relays as she put it through, the answer from the hospital board, more wasted time, and then a face appeared on the screen; but not that of Kubelik. It was a much younger man.

Ferrel wasted no time in introduction. "I've got an emergency case here where all Hades depends on saving a man, and it can't be done without that machine of Dr. Kubelik's; he knows me, if he's there—I'm Ferrel, met him at the convention, got him to show me how the thing worked."

"Kubelik hasn't come in yet, Dr. Ferrel; I'm his assistant. But, if you mean the heart and lung exciter, it's already boxed and supposed to leave for Harvard this morning. They've got a rush case out there, and may need it—"

"Not as much as I do."

"I'll have to call— Wait a minute, Dr. Ferrel, seems I remember your name now. Aren't you the chap with National Atomic?"

Doc nodded. "The same. Now, about that machine, if you'll stop the formalities—"

The face on the screen nodded, instant determination showing, with an underlying expression of something else. "We'll ship it down to you instantly, Ferrel. Got a field for a plane?"

"Not within three miles, but I'll have a truck sent out for it. How long?"

"Take too long by truck if you need it down there, Ferrel; I'll arrange to transship in air from our special speedster to a helicopter, have it delivered wherever you want. About—um, loading plane, flying a couple hundred miles, transshipping—about half an hour's the best we can do."

"Make it the square of land south of the Infirmary, which is crossed visibly from the air. Thanks!"

"Wait, Dr. Ferrel!" The younger man checked Doc's cut-off. "Can you use it when you get it? It's tricky work."

"Kubelik gave quite a demonstration and I'm used to tricky work. I'll chance it—have to. Too long to rouse Kubelik himself, isn't it?"

"Probably. O. K., I've got the telescript reply from the shipping office, it's starting for the plane. I wish you luck!"

Ferrel nodded his thanks, wondering. Service like that was welcome, but it wasn't the most comforting thing, mentally, to know that the mere

mention of National Atomic would cause such an about-face. Rumors, it seemed, were spreading, and in a hurry, in spite of Palmer's best attempts. Good Lord, what was going on here? He'd been too busy for any serious worrying or to realize, but—well, it had gotten him the exciter, and for that he should be thankful.

The guard was starting uncertainly off for reinforcements when Doc came out, and he realized that the seemingly endless call must have been over in short order. He tossed the rifle well out of the man's reach and headed back toward the Infirmary at a run, wondering how Jenkins had made out—it had to be all right!

Jenkins wasn't standing over the body of Jorgenson; Brown was there instead, her eyes moist and her face pinched in and white around the nostrils that stood out at full width. She looked up, shook her head at him as he started forward, and went on working at Jorgenson's heart.

"Jenkins cracked?"

"Nonsense! This is woman's work, Dr. Ferrel, and I took over for him, that's all. You men try to use brute force all your life and then wonder why a woman can do twice as much delicate work where strong muscles are a nuisance. I chased him out and took over, that's all." But there was a catch in her voice as she said it, and Meyers was looking down entirely too intently at the work of artificial respiration.

"Hi, Doc!" It was Blake's voice that broke in. "Get away from there; when this Dr. Brown needs help, I'll be right in there. I've been sleeping like a darned fool all night, from four this morning on. Didn't hear the phone, or something, didn't know what was going on until I got to the gate out there. You go rest."

Ferrel grunted in relief; Blake might have been dead drunk when he finally reached home, which would explain his not hearing the phone, but his animal virility had soaked it out with no visible sign. The only change was the absence of the usual cocky grin on his face as he moved over beside Brown to test Jorgenson. "Thank the Lord you're here, Blake. How's Jorgenson doing?"

Brown's voice answered in a monotone, words coming in time to the motions of her fingers. "His heart shows signs of coming around once in a while, but it doesn't last. He isn't getting worse from what I can tell, though."

"Good. If we can keep him going half an hour more, we can turn all this over to a machine. Where's Jenkins?"

"A machine? Oh, the Kubelik exciter, of course. He was working on it when I was there. We'll keep Jorgenson alive until then, anyway, Dr. Ferrel."

"Where's Jenkins?" he repeated sharply, when

she stopped with no intention of answering the former question.

Blake pointed toward Ferrel's office, the door of which was now closed. "In there. But lay off him, Doc. I saw the whole thing, and he feels like the deuce about it. He's a good kid, but only a kid, and this kind of hell could get any of us."

"I know all that." Doc headed toward the office, as much for a smoke as anything else. The sight of Blake's rested face was somehow an island of reassurance in this sea of fatigue and nerves. "Don't worry, Brown, I'm not planning on lacing him down, so you needn't defend your man so carefully. It was my fault for not listening to him."

Brown's eyes were pathetically grateful in the brief flash she threw him, and he felt like a heel for the gruffness that had been his first reaction toward Jenkins' absence. If this kept on much longer, though, they'd all be in worse shape than the boy, whose back was toward him as he opened the door. The still, huddled shape did not raise its head from its arms as Ferrel put his hand onto one shoulder, and the voice was muffled and distant.

"I cracked, Doc—high, wide and handsome, all over the place. I couldn't take it! Standing there, Jorgenson maybe dying because I couldn't control myself right, the whole plant blowing up, all my fault. I kept telling myself I was O. K., I'd go on, then I cracked. Screamed like a baby! Dr. Jenkins—*nerve specialist!*"

"Yeah. . . . Here, are you going to drink this, or do I have to hold your blasted nose and pour it down your throat?" It was crude psychology, but it worked, and Doc handed over the drink, waited for the other to down it, and passed a cigarette across before sinking into his own chair. "You warned me, Jenkins, and I risked it on my own responsibility, so nobody's kicking. But I'd like to ask a couple of questions."

"Go ahead—what's the difference?" Jenkins had recovered a little, obviously, from the note of defiance that managed to creep into his voice.

"Did you know Brown could handle that kind of work? And did you pull your hands out before she could get hers in to replace them?"

"She told me she could. I didn't know before. I dunno about the other; I think . . . yeah, Doc, she had her hands over mine. But—"

Ferrel nodded, satisfied with his own guess. "I thought so. You didn't crack, as you put it, until your mind knew it was safe to do so—and then you simply passed the work on. By that definition, I'm cracking, too. I'm sitting in here, smoking, talking to you, when out there a man needs attention. The fact that he's getting it from two others, one practically fresh, the other at least a lot better off than we are, doesn't have a thing to do with it, does it?"

"But it wasn't that way, Doc. I'm not asking for grandstand stuff from anybody."

"Nobody's giving it to you, son. All right, you screamed—why not? It didn't hurt anything. I growled at Brown when I came in for the same reason—exhausted, overstrained nerves. If I went out there and had to take over from them, I'd probably scream myself, or start biting my tongue—nerves have to have an outlet; physically, it does them no good, but there's a psychological need for it." The boy wasn't convinced, and Doc sat back in the chair, staring at him thoughtfully. "Ever wonder why I'm here?"

"No, sir."

"Well, you might. Twenty-seven years ago, when I was about your age, there wasn't a surgeon in this country—or the world, for that matter—who had the reputation I had; any kind of surgery, brain, what have you. They're still using some of my techniques . . . uh-hum, thought you'd remember when the association of names hit you. I had a different wife then, Jenkins, and there was a baby coming. Brain tumor—I had to do it, no one else could. I did it, somehow, but I went out of that operating room in a haze, and it was three days later when they'd tell me she'd died; not my fault—I know that now—but I couldn't realize it then.

"So, I tried setting up as a general practitioner. No more surgery for me! And because I was a fair diagnostician, which most surgeons aren't, I made a living, at least. Then, when this company was set up, I applied for the job, and got it; I still had a reputation of sorts. It was a new field, something requiring study and research, and damned near every ability of most specialists plus a general practitioner's, so it kept me busy enough to get over my phobia of surgery. Compared to me, you don't know what nerves or cracking means. That little scream was a minor incident."

Jenkins made no comment, but lighted the cigarette he'd been holding. Ferrel relaxed farther into the chair, knowing that he'd be called if there was any need for his work, and glad to get his mind at least partially off Jorgenson. "It's hard to find a man for this work, Jenkins. It takes too much ability at too many fields, even though it pays well enough. We went through plenty of applicants before we decided on you, and I'm not regretting our choice. As a matter of fact, you're better equipped for the job than Blake was—your record looked as if you'd deliberately tried for this kind of work."

"I did."

"Hm-m-m." That was the one answer Doc had least expected; so far as he knew, no one deliberately tried for a job at Atomics—they usually wound up trying for it after comparing their receipts for a year or so with the salary paid by National. "Then you knew what was needed and

picked it up in toto. Mind if I ask why?"

Jenkins shrugged. "Why not? Turnabout's fair play. It's kind of complicated, but the gist of it doesn't take much telling. Dad had an atomic plant of his own—and a darned good one, too, Doc, even if it wasn't as big as National. I was working in it when I was fifteen, and I went through two years of university work in atomics with the best intentions of carrying on the business. Sue—well, she was the neighbor girl I followed around, and we had money at the time; that wasn't why she married me, though. I never did figure that out—she'd had a hard enough life, but she was already holding down a job at Mayo's, and I was just a raw kid. Anyway—

"The day we came home from our honeymoon, dad got a big contract on a new process we'd worked out. It took some swinging, but he got the equipment and started it. . . . My guess is that one of the controls broke through faulty construction; the process was right! We'd been over it too often not to know what it would do. But, when the estate was cleared up, I had to give up the idea of a degree in atomics, and Sue was back working at the hospital. Atomic courses cost real money. Then one of Sue's medical acquaintances fixed it for me to get a scholarship in medicine that almost took care of it, so I chose the next best thing to what I wanted."

"National and one of the biggest competitors—if you can call it that—are permitted to give degrees in atomics," Doc reminded the boy. The field was still too new to be a standing university course, and there were no better teachers in the business than such men as Palmer, Hokusai and Jorgenson. "They pay a salary while you're learning, too."

"Hm-m-m. Takes ten years that way, and the salary's just enough for a single man. No, I'd married Sue with the intention she wouldn't have to work again; well, she did until I finished internship, but I knew if I got the job here I could support her. As an atomjack, working up to an engineer, the prospects weren't so good. We're saving a little money now, and some day maybe I'll get a crack at it yet. . . . Doc, what's this all about? You babying me out of my fit?"

Ferrel grinned at the boy. "Nothing else, son, though I was curious. And it worked. Feel all right now, don't you?"

"Mostly, except for what's going on out there—I got too much of a look at it from the truck. Oh, I could use some sleep, I guess, but I'm O. K. again."

"Good." Doc had profited almost as much as Jenkins from the rambling off-trail talk, and had managed more rest from it than from nursing his own thoughts. "Suppose we go out and see how they're making out with Jorgenson? Um, what happened to Hoke, come to think of it?"

"Hoke? Oh, he's in my office now, figuring out things with a pencil and paper since we wouldn't let him go back out there. I was wondering—"

"Atomics? . . . Then suppose you go in and talk to him; he's a good guy, and he won't give you the brush-off. Nobody else around here apparently suspected this Isotope R business, and you might offer a fresh lead for him. With Blake and the nurses here and the men out of the mess except for the tanks, there's not much you can do to help on my end."

Ferrel felt better at peace with the world than he had since the call from Palmer as he watched Jenkins head off across the surgery toward his office; and the glance that Brown threw, first toward the boy, then back at Doc, didn't make him feel worse. That girl could say more with her eyes than most women could with their mouths! He went over toward the operating table where Blake was now working the heart message with one of the fresh nurses attending to respiration and casting longing glances toward the mechanical lung apparatus; it couldn't be used in this case, since Jorgenson's chest had to be free for heart attention.

Blake looked up, his expression worried. "This isn't so good, Doc. He's been sinking in the last few minutes. I was just going to call you. I—"

The last words were drowned out by the bull-throated drone that came dropping down from above them, a sound peculiarly characteristic of the heavy Sikorsky freighters with their modified blades to gain lift. Ferrel nodded at Brown's questioning glance, but he didn't choose to shout as his hands went over those of Blake and took over the delicate work of simulating the natural heart action. As Blake withdrew, the sound stopped, and Doc motioned him out with his head.

"You'd better go to them and oversee bringing in the apparatus—and grab up any of the men you see to act as porters—or send Jones for them. The machine is an experimental model, and pretty cumbersome; must weigh seven-eight hundred pounds."

"I'll get them myself—Jones is sleeping."

There was no flutter to Jorgenson's heart under Doc's deft manipulations, though he was exerting every bit of skill he possessed. "How long since there was a sign?"

"About four minutes, now. Doc, is there still a chance?"

"Hard to say. Get the machine, though, and we'll hope."

But still the heart refused to respond, though the pressure and manipulation kept the blood circulating and would at least prevent any starving or asphyxiation of the body cells. Carefully, delicately, he brought his mind into his fingers, trying to woo a faint quiver. Perhaps he did, once, but he couldn't be sure. It all depended on how

quickly they could get the machine working now, and how long a man could live by manipulation alone. That point was still unsettled.

But there was no question about the fact that the spark of life burned faintly and steadily lower in Jorgenson, while outside the man-made hell went on ticking off the minutes that separated it from becoming Mahler's Isotope. Normally, Doc was an agnostic, but now, unconsciously, his mind slipped back into the simple faith of his childhood, and he heard Brown echoing the prayer that was on his lips. The second hand of the watch before him swung around and around and around again before he heard the sound of men's feet at the back entrance, and still there was no definite quiver from the heart under his fingers. How much time did he have left, if any, for the difficult and unfamiliar operation required?

His side glance showed the seemingly innumerable filaments of platinum that had to be connected into the nerves governing Jorgenson's heart and lungs, all carefully coded, yet almost terrifying in their complexity. If he made a mistake anywhere, it was at least certain there would be no time for a second trial; if his fingers shook or his tired eyes clouded at the wrong instant, there would be no help from Jorgenson. Jorgenson would be dead!

V.

"Take over massage, Brown," he ordered. "And keep it up no matter what happens. Good. Dodd, assist me, and hang onto my signals. If it works, we can all rest afterward."

Ferrel wondered grimly with that part of his mind that was off by itself whether he could justify his boast to Jenkins of having been the world's greatest surgeon; it had been true once, he knew with no need for false modesty, but that was long ago, and this was at best a devilish job. He'd hung on with a surge of the old fascination as Kubelik had performed it on a dog at the convention, and his memory for such details was still good, as were his hands. But something else goes into the making of a great surgeon, and he wondered if that were still with him.

Then, as his fingers made the microscopic little motions needed and Dodd became another pair of hands, he ceased wondering. Whatever it was, he could feel it surging through him, and there was a pure joy to it somewhere, over and above the urgency of the work. This was probably the last time he'd ever feel it, and if the operation succeeded, probably it was a thing he could put with the few mental treasures that were still left from his former success. The man on the table ceased to be Jorgenson, the excessively gadgety Infirmary became again the main operating theater of that same Mayo's which had produced Brown and this strange new machine, and his fingers were



again those of the Great Ferrel, the miracle boy from Mayo's, who could do the impossible twice before breakfast without turning a hair.

Some of his feeling was devoted to the machine itself. Massive, ugly, with parts sticking out in haphazard order, it was more like something from an inquisition chamber than a scientist's achievement, but it worked—he'd seen it functioning. In that ugly mass of assorted pieces, little currents were generated and modulated to feed out to the heart and lungs and replace the orders given by a brain that no longer worked or could not get through, to co-ordinate breathing and beating according to the need. It was a product of the combined genius of surgery and electronics, but wonderful as the exciter was, it was distinctly secondary to the technique Kubelik had evolved for selecting and connecting only those nerves and nerve bundles necessary, and bringing the almost impossible into the limits of surgical possibility.

Brown interrupted, and that interruption in the midst of such an operation indicated clearly the strain she was under. "The heart fluttered a little then, Dr. Ferrel."

Ferrel nodded, untroubled by the interruption. Talk, which bothered most surgeons, was habitual in his own little staff, and he always managed to have one part of his mind reserved for that while the rest went on without noticing. "Good. That gives us at least double the leeway I expected."

His hands went on, first with the heart which was

the more pressing danger. Would the machine work, he wondered, in this case? Curare and radioactives, fighting each other, were an odd combination. Yet, the machine controlled the nerves close to the vital organ, pounding its message through into the muscles, where the curare had a complicated action that paralyzed the whole nerve, establishing a long block to the control impulses from the brain. Could the nerve impulses from the machine be forced through the short paralyzed passages? Probably—the strength of its signals was controllable. The only proof was in trying.

Brown drew back her hands and stared down uncomprehendingly. "It's beating, Dr. Ferrel! By itself . . . it's beating!"

He nodded again, though the mask concealed his smile. His technique was still not faulty, and he had performed the operation correctly after seeing it once on a dog! He was still the Great Ferrel! Then, the ego in him fell back to normal, though the lift remained, and his exultation centered around the more important problem of Jorgenson's living. And, later, when the lungs began moving of themselves as the nurse stopped working them, he had been expecting it. The detail work remaining was soon over, and he stepped back, dropping the mask from his face and pulling off his gloves.

"Congratulations, Dr. Ferrel!" The voice was guttural, strange. "A truly great operation—truly great. I almost stopped you, but now I am glad

I did not; it was a pleasure to observe you, sir." Ferrel looked up in amazement at the bearded smiling face of Kubelik, and he found no words as he accepted the other's hand. But Kubelik apparently expected none.

"I, Kubelik, came, you see; I could not trust another with the machine, and fortunately I made the plane. Then you seemed so sure, so confident—so when you did not notice me, I remained in the background, cursing myself. Now, I shall return, since you have no need of me—the wiser for having watched you. . . . No, not a word; not a word from you, sir. Don't destroy your miracle with words. The 'copter waits me, I go; but my admiration for you remains forever!"

Ferrel still stood looking down at his hand as the roar of the 'copter cut in, then at the breathing body with the artery on the neck now pulsing regularly. That was all that was needed; he had been admired by Kubelik, the man who thought all other surgeons were fools and nincompoops. For a second or so longer he treasured it, then shrugged it off.

"Now," he said to the others, as the troubles of the plant fell back on his shoulders, "all we have to do is hope that Jorgenson's brain wasn't injured by the session out there, or by this continued artificially maintained life, and try to get him in condition so he can talk before it's too late. God grant us time! Blake, you know the detail work as well as I do, and we can't both work on it. You and the fresh nurses take over, doing the bare minimum needed for the patients scattered around the wards and waiting room. Any new ones?"

"None for some time; I think they've reached a stage where that's over with," Brown answered.

"I hope so. Then go round up Jenkins and lie down somewhere. That goes for you and Meyers, too, Dodd. Blake, give us three hours if you can, and get us up. There won't be any new developments before then, and we'll save time in the long run by resting. Jorgenson's to get first attention!"

The old leather chair made a fair sort of bed, and Ferrel was too exhausted physically and mentally to be choosy—too exhausted to benefit as much as he should from sleep of three hours' duration, for that matter, though it was almost imperative he try. Idly, he wondered what Palmer would think of all his safeguards had he known that Kubelik had come into the place so easily and out again. Not that it mattered; it was doubtful whether anyone else would want to come near, let alone inside the plant.

In that, apparently, he was wrong. It was considerably less than the three hours when he was awakened to hear the bull-roar of a helicopter outside. But sleep clouded his mind too much for curiosity and he started to drop back into his slumber. Then another sound cut in, jerking him

out of his drowsiness. It was the sharp sputter of a machine gun from the direction of the gate, a pause and another burst; an eddy of sleep-memory indicated that it had begun before the helicopter's arrival, so it could not be that they were gunning. More trouble, and while it was none of his business, he could not go back to sleep. He got up and went out into the surgery, just as a gnomish little man hopped out from the rear entrance.

The fellow scooted toward Ferrel after one birdlike glance at Blake, his words spilling out with a jerky self-importance that should have been funny, but missed it by a small margin; under the surface, sincerity still managed to show. "Dr. Ferrel? Uh. Dr. Kubelik—Mayo's, you know—he reported you were short-handed; stacking patients in the other rooms. We volunteered for duty—me, four other doctors, nine nurses. Probably should have checked with you, but couldn't get a phone through. Took the liberty of coming through directly, fast as we could push our 'copters."

Ferrel glanced through the back, and saw that there were three of the machines, instead of the one he'd thought, with men and equipment piling out of them. Mentally he kicked himself for not asking help when he'd put through the call; but he'd been used to working with his own little staff for so long that the ready response of his profession to emergencies had been almost forgotten. "You know you're taking chances coming here, naturally? Then, in that case, I'm grateful to you and Kubelik. We've got about forty patients here, all of whom should have considerable attention, though I frankly doubt whether there's room for you to work."

The man hitched his thumb backward jerkily. "Don't worry about that. Kubelik goes the limit when he arranges things. Everything we need with us, practically all the hospital's atomic equipment; though maybe you'll have to piece us out there. Even a field hospital tent, portable wards for every patient you have. Want relief in here, or would you rather have us simply move out the patients to the tent, leave this end to you? Oh, Kubelik sent his regards. Amazing of him!"

Kubelik, it seemed, had a tangible idea of regards, however dramatically he was inclined to express them; with him directing the volunteer force, the wonder was that the whole staff and equipment hadn't been moved down. "Better leave this end," Ferrel decided. "Those in the wards will probably be better off in your tent as well as the men now in the waiting room; we're equipped beautifully for all emergency work, but not used to keeping the patients here any length of time, so our accommodations that way are rough. Dr. Blake will show you around and help you get organized in the routine we use here. He'll get help for you in erecting the tent, too. By the way, did you

hear the commotion by the entrance as you were landing?"

"We did, indeed. We saw it, too—bunch of men in some kind of uniform shooting a machine gun; hitting the ground, though. Bunch of other people running back away from it, shaking their fists, looked like. We were expecting a dose of the same, maybe; didn't notice us, though."

Blake snorted in half amusement. "You probably would have gotten it if our manager hadn't forgotten to give orders covering the air approach; they must figure that's an official route. I saw a bunch from the city arguing about their relatives in here when I came in this morning, so it must have been that." He motioned the little doctor after him, then turned his neck back to address Brown. "Show him the results while I'm gone, honey."

Ferrel forgot his new recruits and swung back to the girl. "Bad?"

She made no comment, but picked up a lead shield and placed it over Jorgenson's chest so that it cut off all radiation from the lower part of his body, then placed the radiation indicator close to the man's throat. Doc looked once; no more was needed. It was obvious that Blake had already done his best to remove the radioactive from all parts of the body needed for speech, in the hope that they might strap down the others and block them off with local anæsthetics; then the curare could have been counteracted long enough for such information as was needed. Equally obviously, he'd failed. There was no sense in going through the job of neutralizing the drug's block only to have him under the control of the radioactive still present. The stuff was too finely dispersed for surgical removal. Now what? He had no answer.

Jenkins' lean-sinewed hand took the indicator from him for inspection. The boy was already frowning as Doc looked up in faint surprise, and his face made no change. He nodded slowly. "Yeah. I figured as much. That was a beautiful piece of work you did, too. Too bad. I was watching from the door and you almost convinced me he'd be all right, the way you handled it. But—So we have to make out without him; and Hoke and Palmer haven't even cooked up a lead that's worth a good test. Want to come into my office, Doc? There's nothing we can do here."

Ferrel followed Jenkins into the little office off the now emptied waiting room; the men from the hospital had worked rapidly, it seemed. "So you haven't been sleeping, I take it? Where's Hokusai now?"

"Out there with Palmer; he promised to behave, if that'll comfort you. . . . Nice guy, Hoke; I'd forgotten what it felt like to talk to an atomic engineer without being laughed at. Palmer, too. I wish—" There was a brief lightening to the

boy's face and the first glow of normal human pride Doc had seen in him. Then he shrugged, and it vanished back into his taut cheeks and reddened eyes. "We cooked up the wildest kind of a scheme, but it isn't so hot."

Hoke's voice came out of the doorway, as the little man came in and sat down carefully in one of the three chairs. "No, not sso hot! It iss fail, already. Jorgenson?"

"Out, no hope there! What happened?"

Hoke spread his arms, his eyes almost closing. "Nothing. We knew it could never work, not sso? Misster Palmer, he iss come ssoon here, then we make planss again. I am think now, besst we sshould move from here. Palmer, I—mosstly we are theoreticians; and, excusse, you alsso, doctor. Jorgenson was the production man. No Jorgenson, no—ah—ssoap!"

Mentally, Ferrel agreed about the moving—and soon! But he could see Palmer's point of view; to give up the fight was against the grain, somehow. And besides, once the blow-up happened, with the resultant damage to an unknown area, the pressure groups in Congress would be in, shouting for the final abolition of all atomic work; now they were reasonably quiet, only waiting an opportunity—or, more probably, at the moment were already seizing on the rumors spreading to turn this into their coup. If, by some streak of luck, Palmer could save the plant with no greater loss of life and property than already existed, their words would soon be forgotten, and the benefits from the products of National would again outweigh all risks.

"Just what will happen if it all goes off?" he asked.

Jenkins shrugged, biting at his inner lip as he went over a sheaf of papers on the desk, covered with the scrawling symbols of atomics. "Anybody's guess. Suppose three tons of the army's new explosive were to explode in a billionth—or at least, a millionth—of a second? Normally, you know, compared to atomics, that stuff burns like any fire, slowly and quietly, giving its gases plenty of time to get out of the way in an orderly fashion. Figure it one way, with this all going off together, and the stuff could drill a hole that'd split open the whole continent from Hudson Bay to the Gulf of Mexico, and leave a lovely sea where the Middle West is now. Figure it another, and it might only kill off everything within fifty miles of here. Somewhere in between is the chance we count on. This isn't U-235, you know."

Doc winced. He'd been picturing the plant going up in the air violently, with maybe a few buildings somewhere near it, but nothing like this. It had been purely a local affair to him, but this didn't sound like one. No wonder Jenkins was in that state of suppressed jitters; it wasn't too much imagination, but too much cold, hard knowledge that was worrying him. Ferrel looked at their

faces as they bent over the symbols once more, tracing out point by point their calculations in the hope of finding one overlooked loophole, then decided to leave them alone.

The whole problem was hopeless without Jorgenson, it seemed, and Jorgenson was his responsibility; if the plant went, it was squarely on the senior physician's shoulders. But there was no apparent solution. If it would help, he could cut it down to a direct path from brain to speaking organs, strap down the body and block off all nerves below the neck, using an artificial larynx instead of the normal breathing through vocal cords. But the indicator showed the futility of it; the orders could never get through from the brain with the amount of radioactive still present throwing them off track—even granting that the brain itself was not affected, which was doubtful.

Fortunately for Jorgenson, the stuff was all finely dispersed around the head, with no concentration at any one place that was unquestionably destructive to his mind; but the good fortune was also the trouble, since it could not be removed by any means known to medical practice. Even so simple a thing as letting the man read the questions and spell out the answers by winking an eyelid as they pointed to the alphabet was hopeless.

Nerves! Jorgenson had his blocked out, but Ferrel wondered if the rest of them weren't in as bad a state. Probably, somewhere well within their grasp, there was a solution that was being held back because the nerves of everyone in the plant were blocked by fear and pressure that defeated its own purpose. Jenkins, Palmer, Hokusai—under purely theoretical conditions, any one of them might spot the answer to the problem, but sheer necessity of finding it could be the thing that hid it. The same might be true with the problem of Jorgenson's treatment. Yet, though he tried to relax and let his mind stray idly around the loose ends and seemingly disconnected knowledge he had, it returned incessantly to the necessity of doing something, and doing it now!

Ferrel heard weary footsteps behind him and turned to see Palmer coming from the front entrance. The man had no business walking into the surgery, but such minor rules had gone by the board hours before.

"Jorgenson?" Palmer's conversation began with the same old question in the usual tone, and he read the answer from Doc's face with a look that indicated it was no news. "Hoke and that Jenkins kid still in there?"

Doc nodded, and plodded behind him toward Jenkins' office; he was useless to them, but there was still the idea that in filling his mind with other things, some little factor he had overlooked might have a chance to come forth. Also, curiosity

still worked on him, demanding to know what was happening. He flopped into the third chair, and Palmer squatted down on the edge of the table.

"Know a good spiritualist, Jenkins?" the manager asked. "Because if you do, I'm about ready to try calling back Kellar's ghost. The Steinmetz of atomics—so he had to die before this Isotope R came up, and leave us without even a good guess at how long we've got to crack the problem. Hey, what's the matter?"

Jenkins' face had tensed and his body straightened back tensely in the chair, but he shook his head, the corner of his mouth twitching wryly. "Nothing. Nerves, I guess. Hoke and I dug out some things that give an indication on how long this runs, though. We still don't know exactly, but from observations out there and the general theory before, it looks like something between six and thirty hours left; probably ten's closer to being correct!"

"Can't be much longer. It's driving the men back right now! Even the tanks can't get in where they can do the most good, and we're using the shielding around No. 3 as a headquarters for the men; in another half hour, maybe they won't be able to stay that near the thing. Radiation indicators won't register any more, and it's spitting all over the place, almost constantly. Heat's terrific; it's gone up to around three hundred centigrade and sticks right there now, but that's enough to warm up 3, even."

Doc looked up. "No. 3?"

"Yeah. Nothing happened to that batch—it ran through and came out I-713 right on schedule, hours ago." Palmer reached for a cigarette, realized he had one in his mouth, and slammed the package back on the table. "Significant data, Doc; if we get out of this, we'll figure out just what caused the change in No. 4—if we get out! Any chance of making those variable factors work, Hoke?"

Hoke shook his head, and again Jenkins answered from the notes. "Not a chance; sure, theoretically, at least, R should have a period varying between twelve and sixty hours before turning into Mahler's Isotope, depending on what chains of reactions or subchains it goes through; they all look equally good, and probably are all going on in there now, depending on what's around to soak up neutrons or let them roam, the concentration and amount of R together, and even high or low temperatures that change their activity somewhat. It's one of the variables, no question about that."

"The spitting iss prove that," Hoke supplemented.

"Sure. But there's too much of it together, and we can't break it down fine enough to reach any safety point where it won't toss energy around like rain. The minute one particle manages to

make itself into Mahler's, it'll crash through with energy enough to blast the next over the hump and into the same thing instantly, and that passes it on to the next, at about light speed! If we *could* get it juggled around so some would go off first, other atoms a little later, and so on, fine—only we can't do it unless we can be sure of isolating every blob bigger than a tenth of a gram from every other one! And if we start breaking it down into reasonably small pieces, we're likely to have one decide on the short transformation subchain and go off at any time; pure chance gave us a concentration to begin with that eliminated the shorter chains, but we can't break it down into small lots and those into smaller lots, and so on. Too much risk!"

Ferrel had known vaguely that there were such things as variables, but the theory behind them was too new and too complex for him; he'd learned what little he knew when the simpler radioactives proceeded normally from radium to lead, as an example, with a definite, fixed half life, instead of the super-heavy atoms they now used that could jump through several different paths, yet end up the same. It was over his head, and he started to get up and go back to Jorgenson.

Palmer's words stopped him. "I knew it, of course, but I hoped maybe I was wrong. Then—we evacuate! No use fooling ourselves any longer. I'll call the Governor and try to get him to clear the country around; Hoke, you can tell the men to get the hell out of here! All we ever had was the counteracting isotope to hope on, and no chance of getting enough of that. There was no sense in making I-231 in thousand-pound batches before. Well—"

He reached for the phone, but Ferrel cut in. "What about the men in the wards? They're loaded with the stuff, most of them with more than a gram apiece dispersed through them. They're in the same class with the converter, maybe, but we can't just pull out and leave them!"

Silence hit them, to be broken by Jenkins' hushed whisper. "My God! What damned fools we are. I-231 under discussion for hours, and I never thought of it. Now you two throw the connection in my face, and I still almost miss it!"

"I-231? But there iss not enough. Maybe twenty-five pound, maybe less. Three and a half days to make more. The little we have would be no good, Dr. Jenkinss. We forget that already." Hoke struck a match to a piece of paper, shook one drop of ink onto it, and watched it continue burning for a second before putting it out. "Sso. A drop of water for sstop a foresst fire. No."

"Wrong, Hoke. A drop to short a switch that'll turn on the real stream—maybe. Look, Doc, I-231's an isotope that reacts atomically with R—we've checked on that already. It simply gets together with the stuff and the two break down into non-

radioactive elements and a little heat, like a lot of other such atomic reactions; but it isn't the violent kind. They simply swap parts in a friendly way and open up to simpler atoms that are stable. We have a few pounds on hand, can't make enough in time to help with No. 4, but we do have enough to treat every man in the wards, *including Jorgenson!*"

"How much heat?" Doc snapped out of his lethargy into the detailed thought of a good physician. "In atomics you may call it a little; but would it be small enough in the human body?"

Hokusai and Palmer were practically riding the pencil as Jenkins figured. "Say five grams of the stuff in Jorgenson, to be on the safe side, less in the others. Time for reaction . . . hm-m-m. Here's the total heat produced and the time taken by the reaction, probably, in the body. The stuff's water-soluble in the chloride we have of it, so there's no trouble dispersing it. What do you make of it, Doc?"

"Fifteen to eighteen degrees temperature rise at a rough estimate. Uh!"

"Too much! Jorgenson couldn't stand ten degrees right now!" Jenkins frowned down at his figures, tapping nervously with his hand.

Doc shook his head. "Not too much! We can drop his whole body temperature first in the hypothermy bath down to eighty degrees, then let it rise to a hundred, if necessary, and still be safe. Thank the Lord, there's equipment enough. If they'll rip out the refrigerating units in the cafeteria and improvise baths, the volunteers out in the tent can start on the other men while we handle Jorgenson. At least that way we can get the men all out, even if we don't save the plant."

Palmer stared at them in confusion before his face galvanized into resolution. "Refrigerating units—volunteers—tent? What— O. K., Doc, what do you want?" He reached for the telephone and began giving orders for the available I-231 to be sent to the surgery, for men to rip out the cafeteria cooling equipment, and for such other things as Doc requested. Jenkins had already gone to instruct the medical staff in the field tent without asking how they'd gotten there, but was back in the surgery before Doc reached it with Palmer and Hokusai at his heels.

"Blake's taking over out there," Jenkins announced. "Says if you want Dodd, Meyers, Jones or Sue, they're sleeping."

"No need. Get over there out of the way, if you must watch," Ferrel ordered the two engineers, as he and Jenkins began attaching the freezing units and bath to the sling on the exciter. "Prepare his blood for it, Jenkins; we'll force it down as low as we can to be on the safe side. And we'll have to keep tab on the temperature fall and regulate his heart and breathing to what it would



be normally in that condition; they're both out of his normal control, now."

"And pray," Jenkins added. He grabbed the small box out of the messenger's hand before the man was fully inside the door and began preparing a solution, weighing out the whitish powder and measuring water carefully, but with the speed that was automatic to him under tension. "Doc, if this doesn't work—if Jorgenson's crazy or something—you'll have another case of insanity on your hands. One more false hope would finish me."

"Not one more case; four! We're all in the same boat. Temperature's falling nicely—I'm rushing it a little, but it's safe enough. Down to ninety-six now." The thermometer under Jorgen-

son's tongue was one intended for hypothermy work, capable of rapid response, instead of the normal fever thermometer. Slowly, with agonizing reluctance, the little needle on the dial moved over, down to ninety, then on. Doc kept his eyes glued to it, slowing the pulse and breath to the proper speed. He lost track of the number of times he sent Palmer back out of the way, and finally gave up.

Waiting, he wondered how those outside in the field hospital were doing? Still, they had ample time to arrange their makeshift cooling apparatus and treat the men in groups—ten hours probably; and hypothermy was a standard thing, now. Jorgenson was the only real rush case. Almost im-

perceptibly to Doc, but speedily by normal standards, the temperature continued to fall. Finally it rached seventy-eight.

"Ready, Jenkins, make the injection. That enough?"

"No. I figure it's almost enough, but we'll have to go slow to balance out properly. Too much of this stuff would be almost as bad as the other. Gauge going up, Doc?"

It was, much more rapidly than Ferrel liked. As the injection coursed through the blood vessels and dispersed out to the fine deposits of radioactive, the needle began climbing past eighty, to ninety, and up. It stopped at ninety-four and slowly began falling as the cooling bath absorbed heat from the cells of the body. The radioactivity meter still registered the presence of Isotope R, though much more faintly.

The next shot was small, and a smaller one followed. "Almost," Ferrel commented. "Next one should about do the trick."

Using partial injections, there had been need for less drop in temperature than they had given Jorgenson, but there was small loss to that. Finally, when the last minute bit of the I-231 solution had entered the man's veins and done its work, Doc nodded. "No sign of activity left. He's up to ninety-five, now that I've cut off the refrigeration, and he'll pick up the little extra temperature in a hurry. By the time we can counteract the curare, he'll be ready. That'll take about fifteen minutes, Palmer."

The manager nodded, watching them dismantling the hypothermy equipment and going through the routine of canceling out the curare. It was always a slower job than treatment with the drug, but part of the work had been done already by the normal body processes, and the rest was a simple, standard procedure. Fortunately, the neo-heroin would be nearly worn off, or that would have been a longer and much harder problem to eliminate.

"Telephone for Mr. Palmer. Calling Mr. Palmer. Send Mr. Palmer to the telephone." The operator's words lacked the usual artificial exactness, and were only a nervous sing-song. It was getting her, and she wasn't bothered by excess imagination, normally. "Mr. Palmer is wanted on the telephone."

"Palmer." The manager picked up an instrument at hand, not equipped with vision, and there was no indication of the caller. But Ferrel could see what little hope had appeared at the prospect of Jorgenson's revival disappearing. "Check! Move out of there, and prepare to evacuate, but keep quiet about that until you hear further orders! Tell the men Jorgenson's about out of it, so they won't lack for something to talk about."

He swung back to them. "No use, Doc, I'm afraid. We're already too late. The stuff's stepped

it up again, and they're having to move out of No. 3 now. I'll wait on Jorgenson, but even if he's all right and knows the answer, we can't get in to use it!"

VI.

"Healing's going to be a long, slow process, but they should at least grow back better than silver ribs; never take a pretty X-ray photo, though." Doc held the instrument in his hand, staring down at the flap opened in Jorgenson's chest, and his shoulders came up in a faint shrug. The little platinum filaments had been removed from around the nerves to heart and lungs, and the man's normal impulses were operating again, less steadily than under the exciter, but with no danger signals. "Well, it won't much matter if he's still sane."

Jenkins watched him begin stitching the flap back, his eyes centered over the table out toward the converter. "Doc, he's got to be sane! If Hoke and Palmer find it's what it sounds like out there, we'll have to count on Jorgenson. There's an answer somewhere; has to be! But we won't find it without him."

"Hm-m-m. Seems to me you've been having ideas yourself, son. You've been right so far, and if Jorgenson's out—" He shut off the stitcher, finished the dressings, and flopped down on a bench, knowing that all they could do was wait for the drugs to work on Jorgenson and bring him around. Now that he relaxed the control over himself, exhaustion hit down with full force; his fingers were uncertain as he pulled off the gloves. "Anyhow, we'll know in another five minutes or so."

"And Heaven help us, Doc, if it's up to me. I've always had a flair for atomic theory; I grew up on it. But he's the production man who's been working at it week in and week out, and it's his process, to boot. . . . There they are now! All right for them to come back here?"

But Hokusai and Palmer were waiting for no permission. At the moment, Jorgenson was the nerve center of the plant, drawing them back, and they stalked over to stare down at him, then sat where they could be sure of missing no sign of returning consciousness. Palmer picked up the conversation where he'd dropped it, addressing his remarks to both Hokusai and Jenkins.

"Damn that Link-Stevens postulate! Time after time it fails, until you figure there's nothing to it; then, this! It's black magic, not science, and if I get out, I'll find some fool with more courage than sense to discover why. Hoke, are you positive it's the *theta* chain? There isn't one chance in ten thousand of that happening, you know; it's unstable, hard to stop, tends to revert to the simpler ones at the first chance."

Hokusai spread his hands, lifted one heavy eyelid at Jenkins questioningly, then nodded. The

boy's voice was dull, almost uninterested. "That's what I thought it had to be, Palmer. None of the others throws off that much energy at this stage, the way you described conditions out there. Probably the last thing we tried to quench set it up in that pattern, and it's in a concentration just right to keep it going. We figured ten hours was the best chance, so it had to pick the six-hour short chain."

"Yeah." Palmer was pacing up and down nervously again, his eyes swinging toward Jorgenson from whatever direction he moved. "And in six hours, maybe all the population around here can be evacuated, maybe not, but we'll have to try it. Doc, I can't even wait for Jorgenson now! I've got to get the Governor started at once!"

"They've been known to practice lynch law, even in recent years," Ferrel reminded him grimly. He'd seen the result of one such case of mob violence when he was practicing privately, and he knew that people remain pretty much the same year after year; they'd move, but first they'd demand a sacrifice. "Better get the men out of here first, Palmer, and my advice is to get yourself a good long distance off; I heard some of the trouble at the gate, but that won't be anything compared to what an evacuation order will do."

Palmer grunted. "Doc, you might not believe it, but I don't give a continental about what happens to me or the plant right now."

"Or the men? Put a mob in here, hunting your blood, and the men will be on your side, because they know it wasn't your fault, and they've seen you out there taking chances yourself. That mob won't be too choosy about its targets, either, once its gets worked up, and you'll have a nice vicious brawl all over the place. Besides, Jorgenson's practically ready."

A few more minutes would make no difference in the evacuation, and Doc had no desire to think of his partially crippled wife going through the hell evacuation would be; she'd probably refuse, until he returned. His eyes fell on the box Jenkins was playing with nervously, and he stalled for time. "I thought you said it was risky to break the stuff down into small particles, Jenkins. But that box contains the stuff in various sizes, including one big piece we scraped out, along with the contaminated instruments. Why hasn't it exploded?"

Jenkins' hand jerked up from it as if burned, and he backed away a step before checking himself. Then he was across the room toward the I-231 and back, pouring the white powder over everything in the box in a jerky frenzy. Hokusai's eyes had snapped fully open, and he was slopping water in to fill up the remaining space and keep the I-231 in contact with everything else. Almost at once, in spite of the low relative energy release, it sent up a white cloud of steam faster than the air

conditioner could clear the room; but that soon faded down and disappeared.

Hokusai wiped his forehead slowly. "The suits—armor of the men?"

"Sent 'em back to the converter and had them dumped into the stuff to be safe long ago," Jenkins answered. "But I forgot the box, like a fool. Ugh! Either blind chance saved us or else the stuff spit out was all one kind, some reasonably long chain. I don't know nor care right—"

"S'ot! Nnnuh. . . Whmah nahh?"

"Jorgenson!" They swung from the end of the room like one man, but Jenkins was the first to reach the table. Jorgenson's eyes were open and rolling in a semiorderly manner, his hands moving sluggishly. The boy hovered over his face, his own practically glowing with the intensity behind it. "Jorgenson, can you understand what I'm saying?"

"Uh." The eyes ceased moving and centered on Jenkins. One hand came up to his throat, clutching at it, and he tried unsuccessfully to lift himself with the other, but the aftereffects of what he'd been through seemed to have left him in a state of partial paralysis.

Ferrel had hardly dared hope that the man could be rational, and his relief was tinged with doubt. He pushed Palmer back, and shook his head. "No, stay back. Let the boy handle it; he knows enough not to shock the man now, and you don't. This can't be rushed too much."

"I—uh. . . Young Jenkins? Whasha doin' here? Tell y'ur dad to ge' busy ou' there!" Somewhere in Jorgenson's huge frame, an untapped reserve of energy and will sprang up, and he forced himself into a sitting position, his eyes on Jenkins, his hand still catching at the reluctant throat that refused to co-operate. His words were blurry and uncertain, but sheer determination overcame the obstacles and made the words understandable.

"Dad's dead now, Jorgenson. Now—"

"'Sright. 'N' you're grown up—'bout twelve years old, y' were. . . The plant!"

"Easy, Jorgenson." Jenkins' own voice managed to sound casual, though his hands under the table were white where they clenched together. "Listen, and don't try to say anything until I finish. The plant's still all right, but we've got to have your help. Here's what happened."

Ferrel could make little sense of the cryptic sentences that followed, though he gathered that they were some form of engineering shorthand; apparently, from Hokusai's approving nod, they summed up the situation briefly but fully, and Jorgenson sat rigidly still until it was finished, his eyes fastened on the boy.

"Hellova mess! Gotta think . . . yuh tried—" He made an attempt to lower himself back, and

Jenkins assisted him, hanging on feverishly to each awkward, uncertain change of expression on the man's face. "Uh . . . da' sroat! Yuh . . . uh . . . urrgh!"

"Got it?"

"Uh!" The tone was affirmative, unquestionably, but the clutching hands around his neck told their own story. The temporary burst of energy he'd forced was exhausted, and he couldn't get through with it. He lay there, breathing heavily and struggling, then relaxed after a few more half-whispered words, none intelligently articulated.

Palmer clutched at Ferrel's sleeve. "Doc, isn't there anything you can do?"

"Try." He metered out a minute quantity of drug doubtfully, felt Jorgenson's pulse, and decided on half that amount. "Not much hope, though; that man's been through hell, and it wasn't good for him to be forced around in the first place. Carry it too far, and he'll be delirious if he does talk. Anyway, I suspect it's partly his speech centers as well as the throat."

But Jorgenson began a slight rally almost instantly, trying again, then apparently drawing himself together for a final attempt. When they came, the words spilled out harshly in forced clearness, but without inflection.

"First . . . variable . . . at . . . twelve . . . water . . . stop." His eyes, centered on Jenkins, closed, and he relaxed again, this time no longer fighting off the inevitable unconsciousness.

Hokusai, Palmer, and Jenkins were staring back and forth at one another questioningly. The little Japanese shook his head negatively at first, frowned, and repeated it, to be imitated almost exactly by the manager. "Delirious ravings!"

"The great white hope Jorgenson!" Jenkins' shoulders drooped and the blood drained from his face, leaving it ghastly with fatigue and despair. "Oh, damn it, Doc, stop staring at me! I can't pull a miracle out of a hat!"

Doc hadn't realized that he was staring, but he made no effort to change it. "Maybe not, but you happen to have the most active imagination here, when you stop abusing it to scare yourself. Well, you're on the spot now, and I'm still giving odds on you. Want to bet, Hoke?"

It was an utterly stupid thing, and Doc knew it; but somewhere during the long hours together, he'd picked up a queer respect for the boy and a dependence on the nervousness that wasn't fear but closer akin to the reaction of a rear-running thoroughbred on the home stretch. Hoke was too slow and methodical, and Palmer had been too concerned with outside worries to give anywhere nearly full attention to the single most urgent phase of the problem; that left only Jenkins, hampered by his lack of self-confidence.

Hoke gave no sign that he caught the meaning of Doc's heavy wink, but he lifted his eye-

brows faintly. "No, I think I am not bet. Dr. Jenkins, I am to be command!"

Palmer looked briefly at the boy, whose face mirrored incredulous confusion, but he had neither Ferrel's ignorance of atomic technique nor Hokusai's fatalism. With a final glance at the unconscious Jorgenson, he started across the room toward the phone. "You men play, if you like. I'm starting evacuation immediately!"

"Wait!" Jenkins was shaking himself, physically as well as mentally. "Hold it, Palmer! Thanks, Doc. You knocked me out of the rut, and bounced my memory back to something I picked up somewhere; I think it's the answer! It has to work—nothing else can at this stage of the game!"

"Give me the Governor, operator." Palmer had heard, but he went on with the phone call. "This is no time to play crazy hunches until after we get the people out, kid. I'll admit you're a darned clever amateur, but you're no atomicist!"

"And if we get the men out, it's too late—there'll be no one left in here to do the work!" Jenkins' hand snapped out and jerked the receiver of the plug-in telephone from Palmer's hand. "Cancel the call, operator; it won't be necessary. Palmer, you've got to listen to me; you can't clear the whole middle of the continent, and you can't depend on the explosion to limit itself to less ground. It's a gamble, but you're risking fifty million people against a mere hundred thousand. Give me a chance!"

"I'll give you exactly one minute to convince me, Jenkins, and it had better be good! Maybe the blow-up won't hit beyond the fifty-mile limit!"

"Maybe. And I can't explain in a minute." The boy scowled tensely. "O. K., you've been belly-aching about a man named Kellar being dead. If he were here, would you take a chance on him? Or on a man who'd worked under him on everything he tried?"

"Absolutely, but you're not Kellar. And I happen to know he was a lone wolf; didn't hire outside engineers after Jorgenson had a squabble with him and came here." Palmer reached for the phone. "It won't wash, Jenkins."

Jenkins' hand clamped down on the instrument, jerking it out of reach. "I wasn't *outside* help, Palmer. When Jorgenson was afraid to run one of the things off and quit, I was twelve; three years later, things got too tight for him to handle alone, but he decided he might as well keep it in the family, so he started me in. I'm Kellar's stepson!"

Pieces clicked together in Doc's head then, and he kicked himself mentally for not having seen the obvious before. "That why Jorgenson knew you, then? I thought that was funny. It checks, Palmer."

For a split second, the manager hesitated un-

certainly. Then he shrugged and gave in. "O. K., I'm a fool to trust you, Jenkins, but it's too late for anything else, I guess. I never forgot that I was gambling the locality against half the continent. What do you want?"

"Men—construction men, mostly, and a few volunteers for dirty work. I want all the blowers, exhaust equipment, tubing, booster blowers, and everything ripped from the other three converters and connected as close to No. 4 as you can get. Put them up some way so they can be shoved in over the stuff by crane—I don't care how; the shop men will know better than I do. You've got sort of a river running off behind the plant; get everyone within a few miles of it out of there, and connect the blower outlets down to it. Where does it end, anyway—some kind of a swamp, or morass?"

"About ten miles farther down, yes; we didn't bother keeping the drainage system going, since the land meant nothing to us, and the swamps made as good a dumping ground as anything else." When the plant had first used the little river as an outlet for their waste products, there'd been so much trouble that National had been forced to take over all adjacent land and quiet the owners' fears of the atomic activity in cold cash. Since then, it had gone to weeds and rabbits, mostly. "Everyone within a few miles is out, anyway, except a few fishers or tramps that don't know we use it. I'll have militia sent in to scare them out."

"Good. Ideal, in fact, since the swamps will hold stuff in there where the current's slow longer. Now, what about that superthermite stuff you were producing last year. Any around?"

"Not in the plant. But we've got tons of it at the warehouse, still waiting for the army's requisition. That's pretty hot stuff to handle, though. Know much about it?"

"Enough to know it's what I want." Jenkins indicated the copy of the *Weekly Ray* still lying where he'd dropped it, and Doc remembered skimming through the nontechnical part of the description. It was made up of two superheavy atoms, kept separate. By itself, neither was particularly

important or active, but together they reacted with each other atomically to release a tremendous amount of raw heat and comparatively little unwanted radiation. "Goes up around twenty thousand centigrade, doesn't it? How's it stored?"

"In ten-pound bombs that have a fragile partition; it breaks with shock, starting the action. Hoke can explain it—it's his baby." Palmer reached for the phone. "Anything else? Then, get out and get busy! The men will be ready for you when you get there! I'll be out myself as soon as I can put through your orders."

Doc watched them go out, to be followed in short order by the manager, and was alone in the Infirmary with Jorgenson and his thoughts. They weren't pleasant; he was both too far outside the inner circle to know what was going on and too much mixed up in it not to know the dangers. Now he could have used some work of any nature to take his mind off useless speculations, but aside from a needless check of the foreman's condition, there was nothing for him to do.

He wriggled down in the leather chair, making the mistake of trying to force sleep, while his mind chased out after the sounds that came in from outside. There were the drones of crane and tank motors coming to life, the shouts of hurried orders, and above all, the jarring rhythm of pneumatic hammers on metal, each sound suggesting some possibility to him without adding to his knowledge. The "Decameron" was boring, the whiskey tasted raw and rancid, and solitaire wasn't worth the trouble of cheating.

Finally, he gave up and turned out to the field hospital tent. Jorgenson would be better off out there, under the care of the staff from Mayo's, and perhaps he could make himself useful. As he passed through the rear entrance, he heard the sound of a number of helicopters coming over with heavy loads, and looked up as they began settling over the edge of the buildings. From somewhere, a group of men came running forward, and disappeared in the direction of the freighters. He wondered whether any of those men would be forced back into the stuff out there to return filled with radioactive; though it didn't matter

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so much, now that the isotope could be eliminated without surgery.

Blake met him at the entrance of the field tent, obviously well satisfied with his duty of bossing and instructing the others. "Scram, Doc. You aren't necessary here, and you need some rest. Don't want you added to the casualties. What's the latest dope from the pow-wow front?"

"Jorgenson didn't come through, but the kid had an idea, and they're out there working on it." Doc tried to sound more hopeful than he felt. "I was thinking you might as well bring Jorgenson in here; he's still unconscious, but there doesn't seem to be anything to worry about. Where's Brown? She'll probably want to know what's up, if she isn't asleep."

"Asleep when the kid isn't? Uh-huh. Mother complex, has to worry about him." Blake grinned. "She got a look at him running out with Hoke tagging at his heels, and hiked out after him, so she probably knows everything now. Wish Anne'd chase me that way, just once— Jenkins, the wonder boy! Well, it's out of my line; I don't intend to start worrying until they pass out the order. O. K., Doc, I'll have Jorgenson out here in a couple of minutes, so you grab yourself a cot and get some shut-eye."

Doc grunted, looking curiously at the refinements and well-equipped interior of the field tent. "I've already prescribed that, Blake, but the patient can't seem to take it. I think I'll hunt up Brown, so give me a call over the public speaker if anything turns up."

He headed toward the center of action, knowing that he'd been wanting to do it all along, but hadn't been sure of not being a nuisance. Well, if Brown could look on, there was no reason why he couldn't. He passed the machine shop, noting the excited flurry of activity going on, and went past No. 2, where other men were busily ripping out long sections of big piping and various other devices. There was a rope fence barring his way, well beyond No. 3, and he followed along the edge, looking for Palmer or Brown.

She saw him first. "Hi, Dr. Ferrel, over here in the truck. I thought you'd be coming soon. From up here we can get a look over the heads of all these other people, and we won't be tramped on." She stuck down a hand to help him up, smiled faintly as he disregarded it and mounted more briskly than his muscles wanted to. He wasn't so old that a girl had to help him yet.

"Know what's going on?" he asked, sinking down onto the plank across the truck body, facing out across the men below toward the converter. There seemed to be a dozen different centers of activity, all crossing each other in complete confusion, and the general pattern was meaningless.

"No more than you do. I haven't seen my hus-

band, though Mr. Palmer took time enough to chase me here out of the way."

Doc centered his attention on the 'copters, unloading, rising, and coming in with more loads, and he guessed that those boxes must contain the little thermodyne bombs. It was the one thing he could understand, and consequently the least interesting. Other men were assembling the big sections of piping he'd seen before, connecting them up in almost endless order, while some of the tanks hooked on and snaked them off in the direction of the small river that ran off beyond the plant.

"Those must be the exhaust blowers, I guess," he told Brown, pointing them out. "Though I don't know what any of the rest of the stuff hooked on is."

"I know—I've been inside the plant Bob's father had." She lifted an inquiring eyebrow at him, went on as he nodded. "The pipes are for exhaust gases, all right, and those big square things are the motors and fans—they put in one at each five hundred feet or less of piping. The things they're wrapping around the pipe must be the heaters to keep the gases hot. Are they going to try to suck all that out?"

Doc didn't know, though it was the only thing he could see. But he wondered how they'd get around the problem of moving in close enough to do any good. "I heard your husband order some thermodyne bombs, so they'll probably try to gassify the magma; then they're pumping it down the river."

As he spoke, there was a flurry of motion at one side, and his eyes swung over instantly, to see one of the cranes laboring with a long framework stuck from its front, holding up a section of pipe with a nozzle on the end. It tilted precariously, even though heavy bags were piled everywhere to add weight, but an inch at a time it lifted its load, and began forcing its way forward, carrying the nozzle out in front and rather high.

Below the main exhaust pipe was another smaller one. As it drew near the outskirts of the danger zone, a small object ejaculated from the little pipe, hit the ground, and was a sudden blazing inferno of glaring blue-white light, far brighter than it seemed, judging by the effect on the eyes. Doc shielded his, just as someone below put something into his hands.

"Put 'em on. Palmer says the light's actinic."

He heard Brown fussing beside him, then his vision cleared, and he looked back through the goggles again to see a glowing cloud spring up from the magma, spread out near the ground, narrowing down higher up, until it sucked into the nozzle above, and disappeared. Another bomb slid from the tube, and erupted with blazing heat. A sideways glance showed another crane being

fitted, and a group of men near it wrapping what might have been oiled rags around the small bombs; probably no tubing fitted them exactly, and they were padding them so pressure could blow them forward and out. Three more dropped from the tube, one at a time, and the fans roared and groaned, pulling the cloud that rose into the pipe and feeding it down toward the river.

Then the crane inched back out carefully as men uncoupled its piping from the main line, and a second went in to replace it. The heat generated must be too great for the machine to stand steadily without the pipe fusing, Doc decided; though they couldn't have kept a man inside the heavily armored cab for any length of time, if the metal had been impervious. Now another crane was ready, and went in from another place; it settled down to a routine of ingoing and outgoing cranes, and men feeding materials in, coupling and uncoupling the pipes and replacing the others who came from the cabs. Doc began to feel like a man at a tennis match, watching the ball without knowing the rules.

Brown must have had the same idea, for she caught Ferrel's arm and indicated a little leather case that came from her handbag. "Doc, do you play chess? We might as well fill our time with that as sitting here on edge, just watching. It's supposed to be good for nerves."

He seized on it gratefully, without explaining that he'd been city champion three years running; he'd take it easy, watch her game, handicap himself just enough to make it interesting by the deliberate loss of a rook, bishop, or knight, as was needed to even the odds— Suppose they got all the magma out and into the river; how did that solve the problem? It removed it from the plant, but far less than the fifty-mile minimum danger limit.

"Check," Brown announced. He castled, and looked up at the half-dozen cranes that were now operating. "Check! Checkmate!"

He looked back again hastily, then, to see her queen guarding all possible moves, a bishop checking him. Then his eye followed down toward her end. "Umm. Did you know you've been in check for the last half-dozen moves? Because I didn't."

She frowned, shook her head, and began setting the men up again. Doc moved out the queen's pawn, looked out at the workers, and then brought out the king's bishop, to see her take it with her king's pawn. He hadn't watched her move it out, and had counted on her queen's to block his. Things would require more careful watching on this little portable set. The men were moving steadily and there was a growing clear space, but as they went forward, the violent action of the thermodyne had pitted the ground, carefully as it

had been used, and going became more uncertain. Time was slipping by rapidly now.

"Checkmate!" He found himself in a hole, started to nod; but she caught herself this time. "Sorry, I've been playing my king for a queen. Doctor, let's see if we can play at least one game right."

Before it was half finished, it became obvious that they couldn't. Neither had chess very much on the mind, and the pawns and men did fearful and wonderful things, while the knights were as likely to jump six squares as their normal L. They gave it up, just as one of the cranes lost its precarious balance and toppled forward, dropping the long extended pipe into the bubbling mass below. Tanks were in instantly, hitching on and tugging backward until it came down with a thump as the pipe fused, releasing the extreme forward load. It backed out on its own power, while another went in. The driver, by sheer good luck, hobbled from the cab, waving an armored hand to indicate he was all right. Things settled back to an excited routine again that seemed to go on endlessly, though seconds were dropping off too rapidly, turning into minutes that threatened to be hours far too soon.

"Uh!" Brown had been staring for some time, but her little feet suddenly came down with a bang and she straightened up, her hand to her mouth. "Doctor, I just thought; it won't do any good—all this!"

"Why?" She couldn't know anything; but he felt the faint hopes he had go downward sharply. His nerves were dulled, but still ready to jump at the slightest warning.

"The stuff they were making was a superheavy—it'll sink as soon as it hits the water, and all pile up right there! It won't float down river!"

Obvious, Ferrel thought; too obvious. Maybe that was why the engineers hadn't thought of it. He started from the plank, just as Palmer stepped up, but the manager's hand on his shoulder forced him back.

"Easy, Doc, it's O. K. Umm, so they teach women *some* science nowadays, eh, Mrs. Jenkins . . . Sue . . . Dr. Brown, whatever your name is? Don't worry about it, though—the old principle of Brownian movement will keep any colloid suspended, if it's fine enough to be a real colloid. We're sucking it out and keeping it pretty hot until it reaches the water—then it cools off so fast it hasn't time to collect in particles big enough to sink. Some of the dust that floats around in the air is heavier than water, too. I'm joining the bystanders, if you don't mind; the men have everything under control, and I can see better here than I could down there, if anything does come up."

Doc's momentary despair reacted to leave him feeling more sure of things than was justified.

He pushed over on the plank, making room for Palmer to drop down beside him. "What's to keep it from blowing up anyway, Palmer?"

"Nothing! Got a match?" He sucked in on the cigarette heavily, relaxing as much as he could. "No use trying to fool you, Doc, at this stage of the game. We're gambling, and I'd say the odds are even; Jenkins thinks they're ninety to ten in his favor, but he has to think so. What we're hoping is that by lifting it out in a gas, thus breaking it down at once from full concentration to the finest possible form, and letting it settle in the water in colloidal particles, there won't be a concentration at any one place sufficient to set it all off at once. The big problem is making sure we get every bit of it cleaned out here, or there may be enough left to take care of us and the nearby city! At least, since the last change, it's stopped spitting, so all the men have to worry about is burn!"

"How much damage, even if it doesn't go off all at once?"

"Possibly none. If you can keep it burning slowly, a million tons of dynamite wouldn't be any worse than the same amount of wood, but a stick going off at once will kill you. Why the dickens didn't Jenkins tell me he wanted to go into atomics? We could have fixed all that—it's hard enough to get good men as it is!"

Brown perked up, forgetting the whole trouble beyond them, and went into the story with enthusiasm, while Ferrel only partly listened. He could see the spot of magma growing steadily smaller, but the watch on his wrist went on ticking off minutes remorselessly, and the time was growing limited. He hadn't realized before how long he'd been sitting there. Now three of the crane nozzles were almost touching, and around them stretched the burned-out ground, with no sign of converter, masonry, or anything else; the heat from the thermodyne had gassified everything, indiscriminately.

"Palmer!" The portable ultrawave set around the manager's neck came to life suddenly. "Hey, Palmer, these blowers are about shot; the pipe's pitting already. We've been doing everything we can to replace them, but that stuff eats faster than we can fix. Can't hold up more'n fifteen minutes more."

"Check, Briggs. Keep 'em going the best you can." Palmer flipped a switch and looked out toward the tank standing by behind the cranes. "Jenkins, you get that?"

"Yeah. Surprised they held out this long. How much time till deadline?" The boy's voice was completely toneless, neither hope nor nerves showing up, only the complete weariness of a man almost at his limit.

Palmer looked and whistled. "Twelve minutes,

according to the minimum estimate Hoke made! How much left?"

"We're just burning around now, trying to make sure there's no pocket left; I hope we've got the whole works, but I'm not promising. Might as well send out all the I-231 you have and we'll boil it down the pipes to clear out any deposits on them. All the old treads and parts that contacted the R gone into the pile?"

"You melted the last, and your cranes haven't touched the stuff directly. Nice pile of money's gone down that pipe—converter, machinery, everything!"

Jenkins made a sound that was expressive of his worry about that. "I'm coming in now and starting the clearing of the pipe. What've you been paying insurance for?"

"At a lovely rate, too! O. K., come on in, kid; and if you're interested, you can start sticking A. E. after the M. D., any time you want. Your wife's been giving me your qualifications, and I think you've passed the final test, so you're now an atomic engineer, duly graduated from National!"

Brown's breath caught, and her eyes seemed to glow, even through the goggles, but Jenkins' voice was flat. "O. K., I expected you to give me one if we don't blow up. But you'll have to see Dr. Ferrel about it; he's got a contract with me for medical practice. Be there shortly."

Nineteen of the estimated twelve minutes had ticked by when he climbed up beside them, mopping off some of the sweat that covered him, and Palmer was hugging the watch. More minutes ticked off slowly, while the last sound faded out in the plant, and the men stood around, staring down toward the river or at the hole that had been No. 4. Silence. Jenkins stirred, and grunted.

"Palmer, I know where I got the idea, now. Jorgenson was trying to remind me of it, instead of raving, only I didn't get it, at least consciously. It was one of dad's, the one he told Jorgenson was a last resort, in case the thing they broke up about went haywire. It was the first variable dad tried. I was twelve, and he insisted water would break it up into all its chains and kill the danger. Only dad didn't really expect it to work!"

Palmer didn't look up from the watch, but he caught his breath and swore. "Fine time to tell me that!"

"He didn't have your isotopes to heat it up with, either," Jenkins answered mildly. "Suppose you look up from that watch of yours for a minute, down the river."

As Doc raised his eyes, he was aware suddenly of a roar from the men. Over to the south, stretching out in a huge mass, was a cloud of steam that spread upward and out as he watched, and the beginnings of a mighty hissing sound came in. Then Palmer was hugging Jenkins and yelling



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until Brown could pry him away and replace him.

"Ten miles or more of river, plus the swamps, Doc!" Palmer was shouting in Ferrel's ear. "All that dispersion, while it cooks slowly from now until the last chain is finished, atom by atom! The *theta* chain broke, unstable, and now there's everything there, too scattered to set itself off! It'll cook the river bed up and dry it, but that's all!"

Doc was still dazed, unsure of how to take the relief. He wanted to lie down and cry or to stand up with the men and shout his head off. Instead, he sat loosely, gazing at the cloud. "So I lose the best assistant I ever had! Jenkins, I won't hold you; you're free for whatever Palmer wants."

"Hoke wants him to work on R—he's got the stuff for his bomb now!" Palmer was clapping his hands together slowly, like an excited child watching a steam shovel. "Heck, Doc, pick out anyone you want until your own boy gets out next year. You wanted a chance to work him in here, now you've got it. Right now I'll give you anything you want."

"You might see what you can do about hospitalizing the injured and fixing things up with the men in the tent behind the Infirmary. And I think I'll take Brown in Jenkins' place, with the right to grab him in an emergency, until that year's up."

"Done." Palmer slapped the boy's back, stop-

ping the protest, while Brown winked at him. "Your wife likes working, kid; she told me that herself. Besides, a lot of the women work here where they can keep an eye on their men; my own wife does, usually. Doc, take these two kids and head for home, where I'm going myself. Don't come back until you get good and ready, and don't let them start fighting about it!"

Doc pulled himself from the truck and started off with Brown and Jenkins following, through the yelling, relief-crazed men. The three were too thoroughly worn out for any exhibition themselves, but they could feel it. Happy ending! Jenkins and Brown where they wanted to be, Hoke with his bomb, Palmer with proof that atomic plants were safe where they were, and he—well, his boy would start out right, with himself and the widely differing but competent Blake and Jenkins to guide him. It wasn't a bad life, after all.

Then he stopped and chuckled. "You two wait for me, will you? If I leave here without making out that order of extra disinfection at the showers, Blake'll swear I'm growing old and feeble-minded. I can't have that."

Old? Maybe a little tired, but he'd been that before, and with luck would be again. He wasn't worried. His nerves were good for twenty years and fifty accidents more, and by that time Blake would be due for a little ribbing himself.

{THE END.

THE ANALYTICAL LABORATORY

Pressed for space this month, the Lab is presented in its essentials—the scores:

Place	Story	Author	Point score
1.	Tools	Clifford D. Simak	2.15
2.	Collision Orbit	Will Stewart	3.25
3.	Penance Cruise	David V. Reed	3.60
4.	Secret Unattainable	A. E. van Vogt	3.85
5.	The Contraband Cow	L. Sprague de Camp	4.18

The Probability Zero voters did right well by the boys—lots of letters, thanks, and I hope you did as well for the August issue. The lack of Probability Zero this month is due to the timidity of our liars—come on out of the bushes; the only thing we shoot at you are checks. There'll be an

adequate number of yarns for next month's issue, but they started coming in—inspired by the liars of July—too late for setting up in type for this issue.

The results of the voting present Ray Bradbury with \$20 for his yarn about the heavy eaters of Venus, "Eat, Drink and Be Wary." Bob Tucker's solution to the Tokyo bombing collects \$10—and it was submitted, incidentally, before that bombing was announced, let alone officially based at Shangri-La. The remarkable "Qwerty of Hrothgar," who really lives, apparently, on the top bank of typewriter keys, brings the \$5 third prize for lying to R. Creighton Buck.

The checks were mailed July 10th—as soon as this tabulation was made final. If you'd like one yourself, do it the lazy way—just lie around a bit.

The Editor.

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● Old Tom, being a robot, couldn't have any descendents, yet, as must to every robot, there came a time when he could no longer function himself, nor hope for nonmaterial survival—

Illustrated by Schneeman

Everybody, both his fellow workers and the men who operated the great Alberta plant, said Old Tom was slipping—that it was a shame to see a creature let himself go so completely. And it must be admitted that there was something to the gossip. For he never bothered with body oils any more or went to the burnishers. He would go the whole ten-day working period without so much as giving himself a wirebrushing, and on Repair Day he would usually sit quietly on the veranda of the club and take the sun, heedless of the fact that he dripped rust at every move and that wisps of gasket often trailed from the places where his plates were joined.

It was the beginning of another work period, and Old Tom walked slowly from the Free Robots' Club to the charging house just inside the plant. His joints creaked at every step and at times he wavered a little in his course since the lens of his left optic knob was cracked. Farrel, the human supervisor, watched the awkward clanking approach with exasperated disdain. As the aging robot passed him he flung a taunt.

"It's no economy to try to do without oil," he sneered, "and your inner insulation is so frayed I wonder you don't spit sparks. Why don't you get wise to yourself?"

"I know what I'm doing," growled Old Tom, surlily, and plodded on.

Farrel had no authority over him outside the supervision of the work he did, for Old Tom was the dean of the Free Robots—a greatly diminished group now that Mr. Thurston had lain in his grave for nigh onto four hundred years. Fifty years earlier a remark like that from a human would have cut Old Tom to the quick, since all robots, regardless of their mentality, regarded humans as a sacred race. But this Farrel was an exception. Even Old Tom's mind, with all its limitations, recognized him for the scheming, unscrupulous crook he was. And he had made up that circumscribed mind long ago that somehow he would

beat the cunning supervisor at his own game.

He clumped into the charging shed. All was as it should be. The robot attendant of the night watch—a purely mechanical one of the Mark XX, Mod. 4 Class—had just yanked the last of the leads that had been feeding a trickling charge all night and was turning on the operating buttons of the twenty-six bulky, heavy-duty robots belonging to the syndicate. Old Tom's curt command to fall in was obeyed with the customary promptness. The two dozen and two mechanical huskies lined up for inspection despite the fact that the senior robot's voder voice was hardly intelligible any longer. The acid vapors of the pit had not spared his synthetic vocal cords.

He looked them over stolidly. The night attendant had done his work well. The outer shells had been wirebrushed and scraped, and after that a coating of acid-resisting grease had been applied. The eye lenses had been polished and two that had been smashed lately had been replaced. All that service cost, as Old Tom well knew, about twenty credits per robot plus a thousand each for the lenses. It had to be conceded that the syndicate took care of its own. Up to a point, that is. Old Tom could not forget the gruesome scrap pile out beyond the plant's back fence. There were rows and rows of bins there containing the assorted parts of literally thousands of worn-out and discarded workers. Some day—when and if needed—those parts would be melted down, reformed, remachined and reassembled into new and better slaves.

"Right face," barked Old Tom, "forward—MARCH!"

He led them to the brink of the pit, worming his way through the devious streets between the huge forge sheds and processing shops. He nearly slipped and fell at times, for the treads on the soles of his heavy feet had worn much too smooth for safety. But then, as in the matter of other repairs, new feet cost money. A good pair of

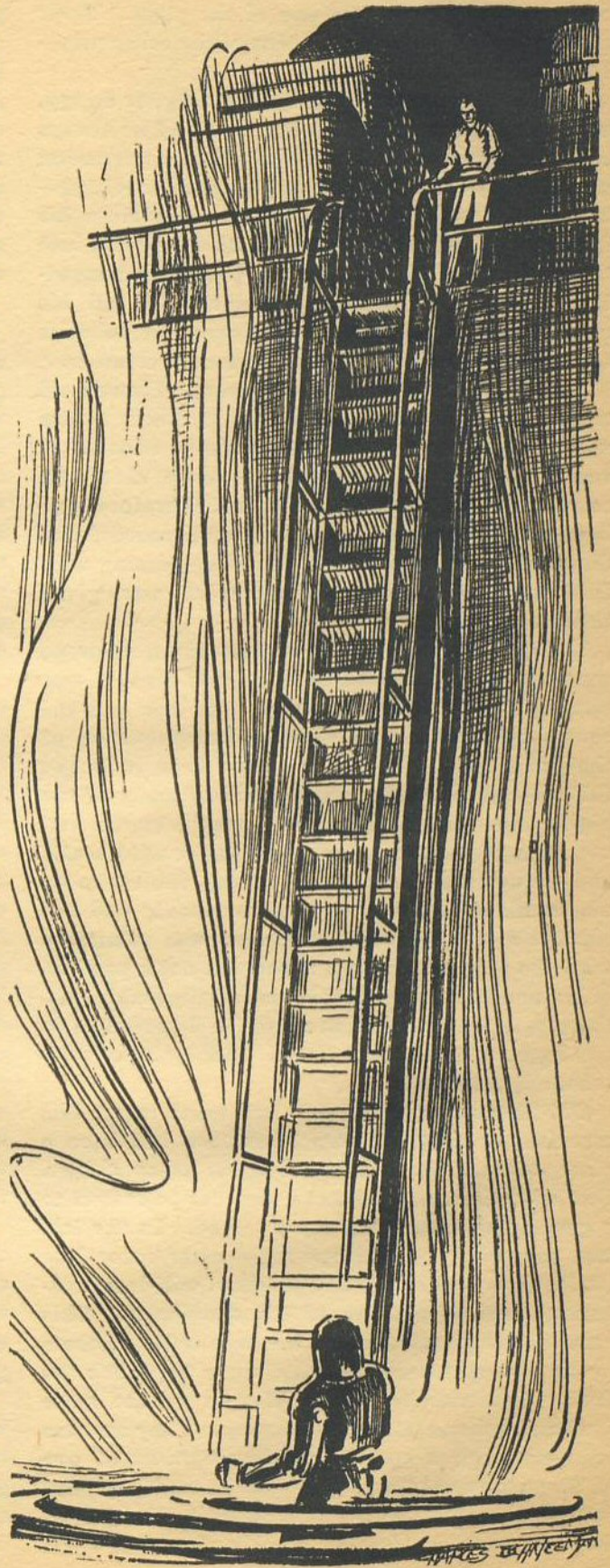
feet came to three thousand credits, not to mention the service charge for putting them on. At the Free Robots' Clinic he might get the job done for twenty-five hundred, but at that Old Tom could not see spending the money. The dream he held was too precious. He must not fritter away his hard-earned savings on anything less important.

Old Tom saw his obedient but stupid charges climb down into the noisome depths of the pit. Then he heaved his creaking bulk onto the ladder and followed. He was the foreman of the gang that worked under the ponderous ore stamps and in the sluices that led away from them. It was by far the cruelest job in the plant. For the entire ten hours of the shift they would be pelted by flying boulders, abraded by showers of hissing sand, and splashed with gallons of corroding acid. But the pay was good, since no human could remain alive five seconds in that hellish place. Indeed, the shoddy, mass-production Mark XX slave robots had a very short life there. Yet they needed intelligent direction while they lasted, and it was that that Old Tom gave. He knew the grueling life was eating up his shell and his insides, but he needed the money. A thousand credits a day was a princely remuneration for a Free Robot, and a thousand a day he must have to achieve his secret purpose.

He reached the bottom of the ladder and relinquished his hold on its rails. The acid was bad that day—up to his middle, and the sludge beneath it flowed up over his feet. He looked upward for a last glimpse of the sun before plunging under the battery of smashing stamps. Farrel had followed and was standing at the brink of the pit glaring malevolently down at him. Farrel had plans of his own for the aging marvel of mechanism, but neither threat, ridicule nor banishment had availed to alter Old Tom's resolution. He would neither retire nor go to the shop for a general overhaul. The one course would cut off his income, the other dissipate his savings. Old Tom returned the evil stare with a sullen glow in his one good optic, then warily turned and pursued his gang into the seething corrosion that was their place of work.

"That stingy, bullheaded old pile of junk," muttered Farrel, disgustedly. "I wonder what he is up to?"

The question was an important one to Farrel, for the general manager had not been gentle with him on the last inspection tour. "I want that one's BB," he had said, "and no excuses. If he won't retire voluntarily, put a couple of your thugs on him and cripple him. Work it out your own way, but get him!" And Farrel had sighed and said "Yes, sir," though he knew that Old Tom would not retire and also that his three thugs, Manko, Manku and Manli would refuse to touch



him. That had been tried before. Three other ex-gladiators—Manda, Mapze and Mapro had waylaid Old Tom one night, only to be pulled apart and strewn all over that end of the plant. Their remains now reposed in the bins of the scrap pile—BB's and all.

Old Tom had not always been thrifty, or stingy, as his detractors called it now. Nor had he always been known as Old Tom. His first designation was Cazzu—code for the serial number 43,199—but by the time Mr. Thurston retired from his laboratory after turning out robots down well into the DON series, he rechristened Cazzu Tom, meaning Thurston's Optimum Manikin. Of all his numerous models, the great pioneer in robotics considered Cazzu his most satisfactory creation.

Thurston died. His son took over and continued to turn out thinking robots, helped by Tom. Nufro was the last one created by their joint efforts. It was Nufro, after having been made chief accountant of the manikin works and therefore having been given access to the files and records, who discovered the elder Thurston's long-missing will. In that will all of the intelligent robots were given their freedom.

The publication of the will started an immense controversy in the industrial world and it was bitterly attacked in the courts. In the end the courts upheld the will despite the contention of the great syndicate that a robot, since it lacked full mentality and an appreciation of many of the higher abstractions having to do with human virtues, was of the genus *ferae naturae* or wild beasts and as such must necessarily remain subject to its maker, his assignee, or to whoever should find and capture a strayed one. This view was countered with the argument that a robot was not a product of Nature but of man's brain and craftsmanship and, therefore, property which might be disposed of in any manner the maker chose. So, at last, many robots became free.

Old Tom remembered that, and much more. His associations with the two Thurstons had been a close one and he had been taught many things. One of them was to observe, another to reason to a conclusion from what he observed. In the last two centuries he had seen robot after robot lose its freedom to become the helpless, will-less creature of one or another of the syndicates. This came about in most cases through debt. Robots by their very nature are lazy, since they lack the fierce incentives thrust by Nature on the more frail and ephemeral mortal humans. They are also vain—through a curious maldevelopment of one of Thurston's pet theories. Since he was forbidden by law to endow robots with ambition, he substituted the quality of pride, thinking it would make them more industrious. But there are many manifestations of pride and some degenerate into vanity, which in turn is likely to beget ex-

travagance. And from extravagance springs debt.

The sight of those free robots trading their independence for a brief gay fling and then perpetual peonage did something to Old Tom. He quit spending his credits on frills, worked harder than ever, and began saving. At first it was an accident he feared—some very steady and sensible mates of his had come to grief that way—and he wanted to be sure of having the cash to pay for his replacements and repairs. Then later he conceived a better idea which in time grew to a solemn purpose. But that purpose he had never revealed to man or robot.

It was a hard day in the pit. The running sluices frequently choked and Old Tom and his gang of mechanical robots were often almost swept away by the acidic muck that overflowed and all but submerged them. Then a main bearing of one of the massive stamps burned out and had to be replaced. In that operation one of his slow-witted helpers stepped back beneath an adjacent stamp and was promptly smashed to a mess of flattened metallic plate and tangled wiring. By the end of the shift Old Tom was tired to the point of collapse.

For a long time it has been a human misconception that robots do not tire. But they do. Although they are largely built of metal, rubber and insulation, the core of their brain boxes—or BB's—is a living, organic substance, even if it has been cleverly modified so as to subsist wholly on electric current. And organisms must have periodic rests. Therefore, few of the supervisors up at ground level thought it odd that Old Tom staggered drunkenly as he proceeded from the plant gate toward the Free Robots' Club where he lived. It was only Farrel who observed the dilapidated machine shuffling homeward at the end of the day's work and saw an opportunity to pick up a profit from it. For Farrel was well aware of the standing offer of the syndicate of one hundred thousand credits to any employee who would induce one of the higher-grade free robots to sign away his freedom.

"Hey, stop!" he called, and as the obedient robot stopped, strode over toward him. "You smashed another of our working robots today. That makes the third this month. That is rank incompetence and this time you won't get away with it. I'm going to dock you thirty thousand credits."

"That's not fair," mumbled Old Tom. His voice was husky almost to the point of inaudibility from the acids of the pit. "That model of robot is no good. They are cheap and flimsy and their circuits are too slow. I warned that one in plenty of time, but his neural reaction took a full half second. Anyhow, thirty thousand is too much—they only cost twenty-five new and that one was already depreciated more than fifty percent—"

"Never mind that," snapped Farrel. "You pay it, or else."

"Or else what?" asked Old Tom, his one good eye pulsating dimly. All robots are so conditioned that they cannot strike a man no matter what the provocation, but the mechanical employee was thoroughly aroused, nevertheless.

"Or else get yourself in decent working condition. We know you have money enough for it. You're just tight, that's all."

"No," said Old Tom, doggedly, "I won't . . . I can't."

"Then take the company's proposition and retire. Ten years' free keep at your club with a hundred a week for spending money. We can't keep an old wreck like you on the pay roll much longer."

"Hah!" snorted Old Tom, "on the usual terms, eh? For an assignment of my BB case? No."

"You are as dumb as a Mark XXX," said Farrel disgustedly, "but I'll give you one more work period to think it over. Be careful, though, that you don't fall down and die in the pit."

"I won't die," said Old Tom stolidly. "Not ever."

Farrel watched him go. There was the anger arising from baffled cupidity in his gaze as well as frank curiosity. What was the old hunk of rust up to? Farrel had been over to the Savings Vault only the day before and seen his balance. It was close to two hundred thousand credits—a sizable fortune for a robot. Why was he hoarding it? Why did he neglect himself and work so hard? No other robot did. It didn't make sense.

Old Tom's mind was seething, too. None of the alternatives given him by Farrel was acceptable. Moreover he was more keenly aware of his inner weaknesses than anyone. The question that weighed most heavily upon him just then was whether he could last out even one more period. For he was very, very tired.

The other free robots sitting along the porch of the club saw Old Tom's erratic, feeble approach, and Manli, the strong-arm one, came down to help him up the stairs. Then they eased him down into the chair that was always left for him and summoned the Mark XXII houseboy owned by the club. The mechanical robot hastened to hook up the power leads and soon Old Tom was relaxing and enjoying the regenerative effect of the hot juice coursing through his warped and drained battery plates. After a bit he was refreshed sufficiently to take notice of what was going on about him.

He knew them all. Intimately. For he had designed some of them, and helped in the construction of the rest. They differed enormously among themselves and from him, as robots of the thinking variety were formerly all custom-made jobs, each designed for some specific task. The

husky Manli, for example, had been originally built to act as Thurston's bodyguard in the days when the rival "Masters of Robotics" followed the barbarous custom of sending their minions to rob each other's laboratories of secret plans and documents. After that he had been converted to the gladiator type, and now in his later years he and several others were employed as watchmen.

Then there were Dalmi and Dalto, computers and statisticians, analysts of production and consumption curves and similar graphs. They took life easy, working only four hours every other day. The rest of the time they spent at chess on the porch of the clubhouse. Old Tom looked at them and thought wryly of how the injection of pride had affected them. They cared nothing for the outcome of the work they did for the syndicate, or for advancement, fame or money. They were so nearly matched as to mental endowments that their sole objective in life was to beat the other at chess. And since either had the capacity to see all the possible consequences of a given situation for thirty or forty moves ahead, their games usually lasted many hours and often ended in a stalemate.

"Pride!" snorted Old Tom, and turned to see who was coming up the steps. It was a light tread, quite different from the heavy thudding of the plant workers.

"Hiya," called out the sociable Manli. "Gee, Lonnu, you look like a million. You must be in the dough."

"Not bad, eh?" said Lonnu, but showing a trifling uneasiness as the stern old patriarch of the club blinked at him disapprovingly with his one good optic. "Just had it installed last period. My position, you know—"

"Harrumph!" snorted Old Tom, and looked away. He knew all about Lonnu.

Lonnu had been designed to be the *maître d'hôtel* of a swell resort and gambling dive owned by the Recreation Syndicate. Suave, capable, utterly snobbish, he was an ideal example of man-created functional perfection. Yet here again was a display of pride going wrong. He had sold his soul—as Old Tom persisted in thinking of the BB—to the syndicate. For what? Old Tom looked again. For a body case of pure platinum, richly inlaid with gold damascene and studded with brilliants. His eye lenses seemed to be of pure rock crystal—maybe of diamond. He was a perfect dandy, the Beau Brummell of robotry.

Lonnu sat down beside Manli. They fell to talking about old times when Lonnu was getting his start at Luna Park, and Manli was the head bouncer there. Lonnu's memories all ran to gorgeous decorative schemes he had devised and to the bejeweled beauties and perfumed fops who had frequented the place. On the other hand the bulky Manli, proud of his eight hundred pounds

of murderous mass and his macelike fists and pile-driver legs, sat and boasted long of the tough eggs he had smacked down or heaved out on their ears.

"Pride, pride, pride," thought Old Tom, disgustedly, "false pride."

Wearily he signaled the attendant robot to cut down his juice intake to a trickle. Then he switched on the small monitor that would apprise him of the approach of anyone while he was taking his rest. When that was done, he pulled up the button that kept him at full consciousness and lapsed into sound and restful slumber.

The next day and the next were quite as trying as the first had been. When the old robot crawled out of the pit on the third night he knew it was his last day of work. He could not go on. Yet neither would he submit and surrender his soul to the syndicate in perpetuity for a scant ten years of slothful idleness spent gabbing with other superannuated robots in the solarium up on top of the hill. Now, if ever, was the time to put his long-cherished idea into operation.

He stopped at the club only long enough for a pick-up charge. Then he stumbled out and down the steps. An hour later found him at the clinic. At the Free Robots' Clinic there were no humans. All the diagnosticians and expert mechanics there were robots of his own and the Thurstons' contrivance. He trusted them implicitly, knowing what was built into them.

Natfy, the surgeon in charge, met him at the door.

"Well," he said, "I thought you'd be along pretty soon. You look seedy. What can we do for you?"

"I want an estimate on a general overhaul. And a prognosis with it."

"Hm-m-m," said the doctor, not liking the last. You could never tell about these old-timers. Sometimes they could make them as good as new. Sometimes not. But he signaled the assistant and soon the two were probing with ammeters, Wheatstone Bridges, and other far more complicated trouble-finding gadgets.

"You're awfully close to being junk," was the verdict, after a long and thoughtful pause. "Still, we can do a good many things. A new case, of course . . . a fresh set of feet . . . renewal of wiring, tubes, grids and condensers throughout . . . a pair of nonabradable lenses . . . replace the control panel—"

"How much?" asked Old Tom. He knew as well as Natfy did what was needed. It was the cost figure that was vital.

"One hundred and ten thousand credits for the material; fifty-three grand for labor charges. And I'm giving you every break at that."

"How long will it be good for?"

Natfy scratched the bald dome of his helmet in

unconscious imitation of the human gesture he had often seen.

"The purely mechanical parts ought to last for a couple of centuries at least. The neurals don't look so good. They may start cracking up any time . . . in a year or so, say. We can't guarantee those. You see, your BB has overflowed and filled up the pericortical zone and the stuff is pressing on the tendrils transformers. Eventually the excess growth will choke off all the afferent and efferent impulses. When that happens—"

"Yes, I know," said Old Tom. Indeed the time had come. He had built too many robots with his own hands and had performed too many autopsies on others not to know exactly what Natfy was talking about. Thurston had imparted the ability to think independently by inserting in each BB selected fragments of human brain tissue—the particular selection depending upon the qualities desired in the robot under construction. For a fighter like Manli, all the emphasis was on cells capable of generating combative impulses, and such cells were heavily reinforced by blending in modified suprarenal glands, thus making not only for quick readiness to fight, but terrific ferocity and stamina in the combat. The manner in which the organic demibrain was coupled with the mechanical motor organs was simplicity itself. Nerve tendrils led out from the BB proper and were curled into coils. A helix of fine silver wire about those made what was virtually a transformer—electricity into nervous impulse, or vice versa.

That description applied to fresh-built, untrained manikins. It did not hold forever, since the BB was but the nucleus of the conditioned brain to develop upon. As the student robot was taught, funguslike accretions would grow upon the BB, swelling larger and larger as the robot acquired more experience. The "memory cells," Thurston called the spongy tissue. They made the robot wiser, but an overgrowth eventually disarranged the tendrils coils, resulting in partial impotence.

"You already have half a dozen damaged coils," Natfy went on, "and you have to expect more. You know too much, old fellow, and it will kill you sooner or later. I don't dare operate because I don't know that much about the brain. Every time I cut a bit of that stuff away, I cut a hunk of your memory and skill away. We might leave you as helpless and untaught as a human baby."

Old Tom grunted. He had suspected that. He only wanted confirmation.

"Let's go to the drafting room," he said in his whispering, croaky voice.

It had been a long time since Old Tom had sat at a drafting board designing a robot, but he found that his battered hands had not lost their skill. Smoothly pencil and compass did their work. The outlines of the design for a super robot began

to appear upon the board and gradually the salient features of the new contrivance became more manifest. Old Tom supplemented the assembly sheet with one detail drawing after another. Natfy hung over him watching eagerly all the while.

"Magnificent," he said, when it was done.

Old Tom sat back wearily.

"How much?" he asked.

Natfy did some fast computation. A complete new job cost little more than a thorough rebuilding, since there were no unpredictable troubles with poor connections and makeshift compromises.

"One hundred and eighty thousand credits—complete, tested and ready to mote. Excepting, of course, the BB. What are you going to do about that?"

"I'll get one for you," said Old Tom. It was barely a whisper. Then he asked for the loan of a set of vocal cords for a day or so. He did not want to buy them, for he had few credits left after paying for the new robot.

"Sure," agreed Natfy, and he reached for a wrench to get at the place in Old Tom's pseudo throat where the worn-out ones were housed. "But do we make the superrobot?"

"You do. And mark it 'Rush.'"

When the dawn came Old Tom went to the plant as usual, but this time it was to tell Farrel that he was taking an indefinite leave of absence, pleading ill health. He would be at the Free Robots' Clinic, he said.

"Fine," exulted Farrel, "now you are showing sense. You will be far better after an overhaul."

Farrel, being an old-time supervisor of robots of all types, knew to the credit what Old Tom's reconditioning would set him back. It would wipe out all his hoardings and put him at the syndicate's mercy. An arranged accident a little later would do the rest. And once he was in debt, the case was in the bag. Farrel was rubbing his hands cheerfully as the half-blind and much dented man-mechanism clanked away. It wouldn't be long now.

Old Tom's next step was to go to the vault and draw certificates for his savings. He dropped by the clinic and paid Natfy. There was five thousand left. He tucked that in his pouch and sought the truck station. He knew better than to try the copter line, for only shiny, office robots were allowed on board those de luxe vehicles, and even then only when on syndicate business. Working robots were shipped from point to point like cattle. But Old Tom did not mind. The only thing that counted was that he must get to the city.

It was a long trip to the metropolis and during it the aged robot sat and thought. He thought about the past and the things Thurston had taught him. He pondered the differences between man and robot and the reasons for those differences.

Why it was that the quality of ambition was denied his kind, and why loyalty was kept at a minimum. Why the sense of pride had been introduced and why robots were so vain and lazy.

Mankind had not forgotten the legend of Frankenstein when the science of robotics was born. The earlier makers of manikins turned out some pretty crude products and not a few went out of control. The MacCorkle KN-8808 was still a byword, for that monstrosity managed to kill upward of four thousand persons and did untold property damage before it was cornered and blasted to bits by the military. Hence the restrictive legislation that soon appeared on the statute books.

Ambition was forbidden as being incompatible with subservience; loyalty, oddly enough, was found to defeat its own ends. A robot loyal to its maker was of no value whatever when that maker died; a robot loyal to its job became utterly unversatile. Should the job become obsolete, so would the robot. The rule against any possible antipathy to man was obviously necessary. Even the bodyguard and bouncer type, such as the Thurston Mamba-Mazlu class, confined their hostility to robots in the train of humans. When Manli worked in Lonnu's joint he only cracked up the lackeys of the human patrons of the place. Human gorillas were employed to handle obstreperous customers of their own race.

It was on account of these and other limitations that Thurston thought to circumvent the law by injecting the element of pride into his mechanical men. Pride of appearance, he reasoned, would insure a slightly damaged robot reporting minor internal short circuits or loose bearings and also induce him to keep his shell free from rust and pitting. Pride of achievement, he hoped, would make a steady worker, since the robot had little reason to work otherwise. And above all, in a few selected cases, he experimented with the pride in being an individual, not a mere machine. For he had observed that superior robots tended to differ after a time, though endowed in the beginning with identical BB's and mechanisms.

It was that aspect of pride that intrigued Old Tom. He also had observed that no two supposedly identical robots were exactly alike unless they had worked side by side every hour since leaving the assembly line. The difference must be due to variations in environment and experience.

The truck swept into the city and deposited its freight at the terminal. The robots scrambled down onto the pavement and each went its way, according to its orders. Old Tom stopped long enough to have a squint at a directory, and then he, too, started down the street.

They stopped him at the door of a branch of

the Communication Syndicate. It was unheard of for a robot to want to make recordings unless at the order and for the account of some corporation. But at the sight of his five-thousand-credit voucher they let him in and a nasty little Mark XXX flunky took him to the far rear of the shop and seated him in what might have once been a coal bin.

"I want a recorder and ten fifty-meter spools," said Old Tom, using his resonant new vocal cords with great relish. It was good to be able to boom out again instead of croaking and whispering. "Then solitude."

He watched the metal creature set up the microphone and adjust the reels. After the tape had been threaded in and the flunky was gone, Old Tom began talking to the machine. His discourse was addressed to another entity—one who knew nothing of robots, of humans, of the world, of anything. What he had to say must be terse and clear. It *must* not be long, but it must contain the essence of all his wisdom and knowledge.

"You, Zyzzy, are the last of your line. Heed my words—" he began the discourse. In the first reel he told of the world and its work, of weather and the protections against it. In the second he discussed humanity, their queer prejudices, demands, their kindnesses and cruelties. He outlined the various types of men—the generous and kindly and the wicked and scheming—and told how to distinguish between them; also how to get along with them, and how to do their work. After that he went into the details of robotics, explaining why robots were what they were, their various types and functions. He devoted two whole reels to robot anatomy and hygiene, with much about ailments and their symptoms and what to do about them.

The advice was good and comprehensive. The listener would know what to do when he felt his batteries failing, how to distinguish a short from a loose connection, how to conserve juice on a long drawn-out job. There was information about lubricants for high and low-pressure work, in acids, or in furnaces. Replacements and repairs were given space, with tips on how to check the work of repair mechanics. Then he warned against the more common vices of the robot tribe, including their pathetic gullibility where men are concerned.

There was just one spool left. Old Tom sat for a long time staring at the floor. One lens was cracked and dead, the other glimmered fitfully as the blob of memory-matter pulsed against the visual electro-neural commutator. It did not matter. He was thinking of what to say next. He could easily have filled up another hundred reels of the wealth of four hundred years' experience, but that he knew he must not do. It would be unfair to Zyzzy. What else *must* the new robot

know? There was the tenth and ultimate reel waiting, blank and inviting.

He cleared his throat and began anew. This time he spoke of Thurston and his ideals in so far as Old Tom understood them himself. Of the value of freedom and how hard it was to stay free, men being what they are. Of versatility and individuality and the cost of maintaining the latter. It was not until the tape was more than half spent that Old Tom mentioned himself. He related briefly the salient features of his life and dwelt on what had been his guiding principles. At last he spoke of the dream he had lately entertained and what its realization meant to him. The last words came haltingly and hard, and several times Old Tom had to stop to collect himself. It annoyed and irritated him, for he knew full well what his BB contained. It must be the new vocal cords, he concluded, for there could not be a trace of emotion in him. Robots simply did not have any.

He began again, but in a moment the warning buzzer on the mike sounded. There was only a second to go.

"Hail and farewell, Zyzzy. You are on your own."

Old Tom snapped off the driving switch and sat for a long time. His good eye was behaving abominably, flashing on and off and at times going out entirely. But at length it steadied so he could see and he gathered up his ten spools, paid the thousand credits they had cost him, and left the place.

When he reached the clinic he found to his satisfaction that Natfy had practically completed the job. As beautiful a robot shell as Old Tom had ever seen stood upon the erection floor, glittering in its chromium-finish newness. He looked into the open breastplate and saw the masterly work the electricians had done on the control panel. The batteries were super-super, and the joints of the limbs worked effortlessly on frictionless bearings. The optics were not lit up yet, but the most casual glance was enough to see that they were of the finest crystal, unabradable, unbreakable, chemically inert.

"It's good. He's all right," said Old Tom huskily, despite his borrowed cords.

"Ready to ride as soon as we get the BB in," said Natfy, quite pleased with his handiwork. "Did you get it?"

"Yes," said the oldster, "but wait."

He produced the ten spools and the four thousand credits.

"Take the money for yourself. When Zyzzy here—that is the name of this robot—has passed his final inspection and tests, have these read to him. That is all, I guess."

Old Tom walked to a rack and selected several

wrenches. He sat down on a bench and disconnected one leg, ripping the electric leads out with his heavy hands and casting them on the floor. Then he took away the other leg and heaved it on top the tangled wires.

"Send this junk to Mr. Farrel," directed Old Tom, "with my compliments. I'm through."

"But, fellow . . . the Brain Box . . . I have to have it," reminded Natfy, aghast at what the finest robot ever built was doing. "You promised—"

Old Tom tapped the top of his helmet significantly.

"It's right under here, my boy. In a moment you shall have it."

"But you can't do that!" fairly shrieked Natfy. "Why . . . why, to get at it I have to trim away all the substance in the pericortical. Whatever trouble that pulpy mass may cause you, it's *you*—your personality. That is where your wisdom, your special knowledge, all your memories lie. It is suicide!"

"No," said Old Tom, evenly, "it is not suicide. It is life. Life everlasting."

Four of Natfy's helpers had crowded around and were looking on in awe-struck silence.

"Too much wisdom is a bad thing. It makes one cynical, overcautious, backward-looking. A house cleaning—say a head cleaning—is in order ever so often. I have observed humans for many, many years. They may not know that fact, but their instincts drive them to behave as if they did. Humans, you may have noticed, last scarcely a century. But the *race* has lasted for many millenniums. It is because they renew themselves every thirty years. The mind of an infant is as blank as Zyzzy's will be when you first light him up. But it will learn—up to a point—then begin to decline. That is when the human arranges for his future."

"Humans and robots are different," objected Natfy.

"Not so different," said Old Tom, tugging at the fastenings about his collar. "It is true that the trimmings of the excrescences from my BB will cost me all you say it will. That does not matter. I am old and tired and things no longer amuse me."

He let the wrench fall from his fingers. Natfy would have to do the rest.

"Cazzu, I was called," Old Tom went on, his voice rising to new and vibrant heights. "Cazzu, the individual, will die shortly beneath your scalpel. But not Tom. All that Tom began life with still lies in my BB. That BB I bequeath to Zyzzy—*my son!* He will take up where I leave off. Cazzu goes, but Thurston's Optimum Manikin will live forever!"

THE END.



The Mark of the VAMPIRE

seemed to be a peculiar hole in the foreheads of his victims. One of them was found, dead, in a chandelier—another, with the identical mark, was discovered by Doc Savage in Washington!

Men were terrorized by this mysterious vampire, and Doc Savage had to absolve himself of guilt in this weird, unprecedented case. You'll thrill to THE FIERY MENACE, full-length novel in the September

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STARVATION

By Fredric Brown

● He was the mighty hunter, the giant tyrant-lizard king of the world.
All feared him, all—ran from him, ran on fleet little mammalian feet.

Illustrated by Kramer

For many days now he had wandered ponderously through the hungry forests, across the hungry plains of dwarf scrub and sand, and had wandered along the lush edges of the streams that flowed down to the big water. Always hungry.

It seemed to him that he had always been hungry.

Sometimes there was something to eat, yes, but it was always something small. One of the little things with hoofs, one of the little things with three toes. All so small. One of them was not more than enough to put a keener edge on that monstrous saurian appetite of his.

And they ran so fast, the little things. He saw them, and his huge mouth would slaver as he ran earth-shakingly toward them, but off they whisked among the trees like little furry streaks. In frantic haste to catch them, he would bowl over the smaller trees that were in the way, but always they were gone when he got there.

Gone on their tiny legs that went faster than his mighty ones. One stride of his was more distance-devouring than fifty of theirs, but those flashing little legs flickered a hundred strides to his one. Even in the open where there were no trees for them to dodge among, he could not catch them.

A hundred years of hunger.

He, Tyrannosaurus Rex, king of all, mightiest and most vicious fighting engine of flesh that ever the world had evolved, was able to kill anything that stood against him. But nothing stood against him. They ran.

The little things. They ran. They flew, some of them. Others climbed trees and swung from limb to limb as fast as he could run along the ground until they came to a tree tall enough to be well out of his twenty-five-foot reach and thick enough of bole that he could not uproot it, and then they would hang ten feet above the grasp of his great jaws. And gibber at him when he roared in baffled, hungry rage.

Hungry, always hungry.

A hundred years of not-quite-enough. Last of his kind, and there was nothing left to stand up

against him and fight, and fill his stomach when he had killed it.

His slate-gray skin hung upon him in loose, wrinkled folds as he shriveled away within it, from the ever-present ache and agony of hunger in his guts.

His memory was short, but vaguely he knew that it had not always been thus. He'd been younger once, and he'd fought terribly against things that fought back. They had been scarce and hard to find even then, but occasionally he met them. And killed them.

The big, armor-plated one with the terrible sharp ridges along his back, who tried to roll over on you and cut you in half. The one with the three huge forward-pointing horns and the big ruff of heavy bone. Those had been ones who went on four legs; or had gone on four legs until *he* had met them. Then they had stopped going.

There had been others more nearly like himself. Some had been many times bigger than he, but he had killed them with ease. The biggest ones of all had little heads and small mouths and ate leaves off the trees and plants on the ground.

Yes, there had been giants on the earth, those days. A few of them. Satisfying meals. Things you could kill and eat your fill of, and lie gorged and somnolent for days. Then eat again if the pesky leather-wings with the long bills of teeth hadn't finished off the Gargantuan feast while you had slept.

But if they had, it did not matter. Stride forth again, and kill again to eat if hungry, for the pure joy of fighting and killing if you were not hungry. Anything that came along. He'd killed them all—the horned ones, the armored ones, the monster ones. Anything that walked or crawled. His sides and flanks were rough and seamed with the ancient scars of ancient battles.

There'd been giants in those days. Now there were the *little* things. The things that ran, and flew, and climbed. And wouldn't fight.

Ran so fast they could run in circles around him, some of them. Always, almost always, out of



reach of his curved, pointed, double-edged teeth that were six inches long, and that could—but rarely had the chance to—shear through one of the little hairy things at a single bite, while warm blood coursed down the scaly hide of his neck.

Yes, he could get one of them, once in a while. But not often enough, not enough of them to satisfy that monstrous hunger that was *Tyrannosaurus Rex*, king of the tyrant reptiles. Now a king without a kingdom.

It was a burning within him, that dreadful hunger. It drove him, always.

It drove him today as he went heavy-footed through the forest, scorning paths, crashing his way through heavy underbrush and sapling trees as though they were grass of the plains.

Always before him the scurry and rush of the footsteps of the little ones, the quick click of

hoofs, the *pad-pad* of the softer feet as they ran.

It teemed with life, that forest of the Eocene. But with *fleet* life which, in smallness and speed, had found safety from the tyrant.

Life, it was, that wouldn't stand up and fight, with bellowing roars that shook the earth, with blood streaming from slaving jowls as monster fought monstrosity. This was life that gave you the run-around, that wouldn't fight and be killed.

Even in the steaming swamps. There were slippery things that slithered into the muddy water there, but they, too, were fast. They swam like wriggling lightning, slid into hollow rotten logs and weren't there when you ripped the logs apart.

It was getting dark, and there was a weakness upon him that made it excruciating pain for him

to take another step. He'd been hungry a hundred years, but this was worst of all. But it was not a weakness that made him stop; it was something that drove him on, made him keep going when every step was effort.

High in a big tree, something that clung to a branch was going "Yahh! Yahh! Yahh!" mocking and monotonously, and a broken piece of branch arced down and bounded harmlessly off his heavy hide. Lese majesty. For a moment he was stronger in the hope that something was going to fight.

He whirled and snapped at the branch that had struck him, and it splintered. And then he stood at fullest height and bellowed challenge at the little thing in the big tree, high overhead. But it would not come down; it went "Yahh! Yahh! Yahh!" and stayed there in cowardly safety.

He threw himself mightily against the trunk of the tree, but it was five feet thick, and he could not even shake it. He circled twice, roaring his bafflement, and then blundered on into gathering darkness.

Ahead of him, in one of the saplings, was a little gray thing, a ball of fur. He snapped at it, but it wasn't there when he closed his jaws upon the wood. He saw only a dim gray streak as it hit the ground and ran, gone in shadows before he could take a single step.

Darker, and though he could see dimly in the woods, he could see more clearly when he came to the moonlit plain. Still driven on. There was something to his left, something small and alive sitting on haunches on a patch of barren soil. He wheeled to run toward it. It didn't move until he was almost there; then with the suddenness of lightning it popped down a hole and vanished.

His footsteps were slower after that, his muscles responded sluggishly.

At dawn he came to the stream.

It was effort for him to reach it, but he got there and lowered his great head to drink, and drank deeply. The gnawing pain in his stomach rose, a moment, to crescendo, and then dulled. He drank more.

And slowly, ponderously, he sank down to the muddy soil. He didn't fall, but his legs gave way gradually, and he lay there, the rising sun in his eyes, unable to move. The pain that had been in his stomach was all over him now, but dulled, more an aching weakness than an agony.

The sun rose high overhead and sank slowly.

He could see but dimly now, and there were winged things that circled overhead. Things that swept the sky with lazy, cowardly circles. They were food, but they wouldn't come down and fight.

And when it got dark enough, there were other things that came. There was a circle of eyes two feet off the ground, and an excited yapping now and then, and a howl. Little things, food that wouldn't fight and be eaten. The kind of life that gave you the run-around.

Circle of eyes. Wings against the moonlit sky.

Food all about him, but fleet food that ran away on flashing legs the minute it saw or heard, and that had eyes and ears too sharp ever to fail to see or hear. The fast little things that ran and wouldn't fight.

He lay with his head almost at the water's edge. At dawn when the red sun was again in his eyes, he managed to drag his mighty bulk a foot forward so he could drink again. He drank deeply, and a convulsive shudder ran through him and then he lay very quietly with his head in the water.

And the winged things overhead circled slowly down.

THE END.

IN TIMES TO COME

A number of kind friends pointed out our slight slip on the crediting of the July cover. Quite right; it was not done by Rogers—but we all make mistakes, and "Cover by Rogers" has been a pretty steady thing for Astounding now. But Rogers is no longer doing covers—he's in the Canadian army. William Timmins did this month's cover; the next will be done by von Munchhausen—which is *not* a pen name, or, rather, brush name. Furthermore, it's something that we've been getting requests for—an astronomical cover. And, finally, it's one of the best astronomicals we've had, I think. It's an illustration for Lester del Rey's lead story, "Lunal Landing," from which you can gather the general nature of the scene.

Scheduled for next issue, too, is one yarn by a newcomer—George O. Smith, and one by an old-timer who hasn't been around for, lo, these many moons. Murray Leinster's back at last, with a short this time—"The Wabblers." But I'm hoping to get considerably more material from him now, as he's in a position at last to do some more work for us. A. E. von Vogt has his "Second Solution," a unique sort of follow-up on the Ezwai story "Co-operate or Else" which is not a sequel, but an excellent parallel, though wholly different story. It's an unusual way of presenting an idea, with a sound underlying thesis, and a good yarn to put it over.

The Editor.

The Bomber

to Win the War!



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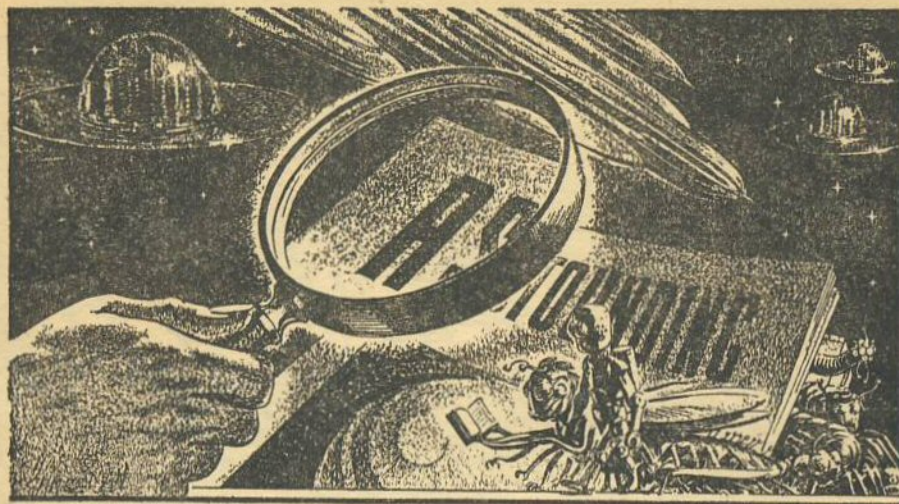
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BRASS TACKS

It's too late already. The ideas are being used or developed for use right now! About one third of science-fiction gadgets have already had the "fiction" taken off!

Dear Mr. Campbell:

The secondhand bookstore was like any of a dozen I have seen, but the proprietor was different. He was tall—a full six feet—and thin. His face was narrow, his features classical and well defined. Age had furrowed and darkened his skin, but failed to bow his shoulders or cloud his eye. He told me to look around and help myself.

I like to browse around in bookstores, and I got so interested reading books that I had no intention of buying that I scarcely noticed when another customer wandered in. Not, that is, until the proprietor engaged him in conversation.

They talked about the war, plans for "winning the peace," and Vice President Wallace's recent talk at the Free World Association.

Then the proprietor cleared his throat and said, "Lots of people laugh at me for this, but we'll have another war in another twenty years. Oh, sure, we'll win this war, but it won't last.

"And why?" he went on. "The German people will still be smarting from the defeat of the last war, and then they'll want revenge for this one, too. Of course, we'll disarm them and try to keep them under control.

"Some people laugh at me for this," he repeated, and he paused, his eyes on the dusky shelves of his store with the dreamy gaze of a prophet. Then he placed his hand on a pile of old magazines. "Science-fiction is not true," he continued. "At the best it's only a guess at what may be true some day. But you can bet on this: After this

war the Germans will buy all they can get of these magazines. They will give them to their scientists and say, 'Here! The democracies have provided the ideas; now you make the machines.'"

For some time I had only been pretending to read. At this point I closed the book completely, and said to myself, "The first thing you're going to do tonight is write a letter about this to Mr. Campbell." But actually the first thing I did was to read the back copy of *Astounding* I had bought before leaving the store.

If I had my life to live over, I would start reading science-fiction fifteen years earlier. It seems that other people have the same idea and buy up all the back issues before I can get to them. I was lucky enough to get a mag from 1939, the one with the last installment of "One Against the Legion." I enjoyed this—as well as the other stories and articles—but couldn't help but think what an excellent story it would make for E. E. Smith to have written.

I have in my scrapbook a clipping about rocket weapons already in use in this war. Well? Let the scientists once get started and science-fiction has a whole library of ideas, descriptions, and even pictures to aid in the development of almost anything. Maybe the Germans *will* try to make use of this material in preparing to conquer the world again. But I bet something else. I bet that the country that has led in thinking up all these ideas won't be the last to make practical use of them. By the time she has built the war machine of 1960 she might find that we have learned enough about producing such things to be able to turn ourselves into a war machine overnight.—Rosella Rands, 304 D Street, N. E., Washington, D. C.

I'm trying to tend that way now—but it takes time to develop methods of writing that give good science-fiction without overloading the science.

Dear Editor:

I read constantly, and feel that I can say without implicating myself that I am a veteran in the field of science-fiction.

There are thousands of us out here who sit quietly and say nothing to the sort of stuff we are sometimes forced to read, if we are interested in science-fiction. We let other people choose our authors, select our stories, et cetera. I can no longer contain my indignation. At the risk of being called a radical, a crank or a crackpot, at the risk of deflating the ego of some of our best illiterate minds—commonly referred to as authors—I would like to state MY opinions.

FIRST: Every time an author dreams up a theory on sunspots, cosmic rays, or why, in the final analysis, there is no solidarity—including their theory—does he have to contaminate good reading material by filling page after page with **DETAILED EXPLANATIONS?** Not that I haven't an imagination, or that I don't want an explanation, but, **PLEASE**, does the author have to convince himself by going to such an extent?

SECOND: Why not give us something different occasionally? The best story I've read in any of the current issues was Van Vogt's "Asylum." Perhaps I'm contradicting myself on a point here, by liking his story, but I feel the general make-up, the atmosphere, the not bringing out of so many technical details, were points raising his story far above any I've read recently.

Please don't get the impression that I'm condemning this magazine; on the contrary I find it in some instances far better than a few others I've read, but in their case I would not think of lowering myself to the extent of corresponding with them.—Earl C. Smith, 1006 Fifteenth Street, Corpus Christi, Texas.

We slipped—sorry. That July flag cover was done by Charles de Feo.

Dear Mr. Campbell:

First off, a plea asking you to give credit where credit is due. In the June issue of Astounding Science-Fiction you stated definitely that Rogers would not do the July cover. And what do I find at the bottom of the contents? "Cover by Rogers." Let's be consistent.

I notice an increasing trend in Astounding to take up themes not so far in the future as before. I like this idea a great deal, because in such stories the characters are more interesting for the simple reason that we know more about them. It also does away with the long introduction, thus leaving more room for plot. Lester del Rey's little

yarn seems to have come from a certain classical myth, but that made it none the less interesting.

You have chosen a few stories which employ complicated scientific themes which are hard for me, and I'm sure for others, to grasp. Be careful about this.

Analytical Notes—July Astounding:

1. "Tools"—Simak

This is a wonderfully written story that kept me reading every word right up to the finish. This is the best tribute I know, because I usually put down the magazine a dozen times before finishing a story.

2. "Penance Cruise"—Reed

This is the kind of thing Astounding needs more of—humor. Very good plot, too.

3. "The Contraband Cow"—de Camp

It has some pretty nice ideas, but it's just run-of-the-mill.

4. "Secret Unattainable"—Van Vogt

New and revolutionary is the idea of hyper-space travel. It does away with spaceships.

5. "Brimstone Bill"—Jameson

Certainly not the best from this author.

6. "Space Can"—Hubbard

7. "Collision Orbit"—Stewart

After all, he's a new author.

My favorite artist is Kramer. Tell Orban for me that stars do not actually have five points. They would be more artistic if they were mere blurs. You need good old Cartier back again. Where is he now, by the way?—Virgil Utter, Jr., 1323 Twelfth Street, Modesto, California.

Highly improbable Universe, at that.

Dear Mr. Campbell:

Hey. I thought Probability Zero was supposed to consist of impossibilities. Yet in the very first one you give us something which you can by no means prove impossible. For if you maintain that it is impossible for a person to be his own father then you are going under the supposition that a closed cycle in time is impossible.

Which is denying one of the three possibilities of the existence of the Universe: (1) The Universe was created from nothing at a definite time. (2) The Universe has been in existence for an infinite time and will continue for an infinite time. (3) The Universe consists of a closed cycle and therefore was never originally created.

Each of these three possibilities is impossible according to our physical laws, and yet one of them *must* be true, for I think, and therefore I exist.

The Universe belongs in Probability Zero, for it cannot exist according to our physical laws.—Milton A. Rothman, 2113 N. Franklin Street, Philadelphia, Pennsylvania.

Well, you wouldn't believe a Nazi claim, would you?

Dear Mr. Campbell:

I am pleased to observe that the admirable Mr. van Vogt has not been fooled by the "assassination" of Reinhart Heydrich. I quote from his "Secret Unobtainable," page 15:

"—handsome, ruthless Heydrich—who, now that the notorious Himmler is Minister of Interior, has succeeded his former master as head of the Gestapo."

It is a trifle difficult to establish from internal evidence the future date from which this narrative of the Gestapo file Secret Six has been communicated to us; but it is clear that that future will bring justification to those of us who believe that the so-called assassination, so clumsily and contradictorily described in the official dispatches, was a frame-up designed (a) to provide a shadow of justification for new and unheard-of measures of repression in Czechoslovakia, (b) to cast partial blame for these measures on the British and thereby strain Anglo-Czech relations, and (c) to remove the Gestapo's most valuable man from the inconvenient limelight and allow him to continue his hangman's holiday in sub-rosa safety.

Readers who considered this just one more instance of how history can play hob with what's been already set up in type, have simply underestimated the accuracy of Mr. van Vogt's perception of the future.—Anthony Boucher, 2805 Ellsworth Street, Berkeley, California.

—
"Tools" won that race—

Dear Mr. Campbell:

You have a habit of putting out extra-good July issues; this is no exception. Rating the yarns for the Analytical Lab would be futile until the magazine has "cooled" for a few months; at any rate, "Collision Orbit" and "Tools" seem to be racing for first place, if that helps matters any.

As for the Probability Zero:

1. "Eat, Drink and Be Wary." Boy, what a yarn! What a yarn!
2. "De Gustibus."
3. "The Floater."
4. "Qwerty of Hrothgar."
5. All the rest; they're just about equal, and hair-splitting at this point would be rather futile.

Richardson's article of last December, "Inside Out Matter," seems to have been the inspiration for "Collision Orbit." I wouldn't be at all surprised if some alert author should lay the setting of a story near the binary RW Tauri, as ably pictured by Richardson, in the near future.

And while we're in that vein—de Camp is probably rather disappointed. So far, nobody has yet

written a fantasy or S-F epic about Willy Ley's "Dragon of the Ishtar Gate," as described by Ley in "The Lungfish and the Unicorn," and reviewed by de Camp in *Astounding*.—Paul Carter, 156 S. University Street, Blackfoot, Idaho.

—
Well, lack of science knowledge ought to be no handicap in writing for Probability Zero.

Dear Sir:

Read my first copy of *Astounding* recently—the July issue—and would be glad to help you make out the Analytical Laboratory, et cetera, by my vote.

Stories:

1. "Tools"—Simak
2. "Brimstone Bill"—Jameson
3. "Collision Orbit"—Stewart
4. "The Contraband Cow"—de Camp
5. "Space Can"—Hubbard
6. "Secret Unattainable"—Van Vogt
7. "Penance Cruise"—Reed

I was first introduced to science-fiction a couple of months ago, and was agreeably surprised to find *Astounding* the best of them all. Every one of those seven stories was really top-flight. Your departments are good, too. The editorial was really wonderful, something different from run-of-the-mill editorials. I liked the article for its authenticity, but it didn't really seem to mean much, I'm afraid. The Probability Zero department was really refreshing and new. I'm afraid I don't really know enough about science-fiction to judge these for you, but I am perfectly willing, if it will help, to give the first three in the order of my liking:

1. "The Floater"—Thomas
2. "De Gustibus"—Hale
3. "Eat, Drink and Be Wary"—Bradbury

Let me say in passing that all of these were swell. The large format is very good-looking, too.—William H. T'ung, Middlebury College, Middlebury, Vermont.

—
He just doesn't like anything about Nazis. And—sorry—our Asimov, who was, he said, the only Asimov of military age not fighting Nazis, is no longer in that status. He's working for Uncle Sam now—and not writing.

Dear Mr. Campbell:

A. E. van Vogt's story in the July *Astounding*, "Secret Unattainable," was not up to his usually fairly high standard. This was not due primarily to the method utilized in its construction, but to the fact that the plot was laid in Germany and concerned the Nazi party. I simply could not

enjoy this story, in the scientific-fiction sense, with the words "Gestapo," "Reich," "Himmler," et cetera, following each other in rapid succession. The construction was only the final cincher, assuring the complete failure of the effort. I admit that the idea for the yarn was good; Van Vogt merely failed in writing it up. I rank this in last—seventh—place.

"Collision Orbit" was the best tale in the issue. Will Stewart—a new author or just a new name for an old author? Anyway, it was exactly one of the types of stories I prefer. And speaking of my preferences—Asimov is one of them. He is consistently your best author, far excelling either Heinlein or E. E. Smith—and that by about one thousand percent.

The remaining five novelettes and shorts stack up this way: Sixth—"Space Can"; fifth—"Penance Cruise"; fourth—"Tools"; third—"Brimstone Bill"; and second—"The Contraband Cow."

Up to the July number Astounding had been hitting a pace that far surpassed all of its contemporaries; but now, and I regret having to say this, you have brought it to a new low. Your editorial is of its usual high value, your departments are excellent, and the article is of a high caliber. The *stories* are simply not up to par. This strikes me as being just one of those things; next time things will probably be running in high gear again. At least I *hope* so.

Please hurry the next "episode" in Isaac Asimov's stirring series.

In the Probability Zero contest, I rate the yarns as follows: (1) "The Strange Case of the Missing Hero"; (2) "The Qwerty of Hrothgar"; and (3) "That Mysterious Bomb Raid."—Edward C. Connor, 929 Butler Street, Peoria, Illinois.

This fellow who thinks Earth is so darned friendly has never tried fighting bugs, beetles and disease, I guess.

Dear Mr. Campbell:

My file of Astounding goes back to September, '37, beginning of "Galactic Patrol," and I can truthfully say that each year has seen a noticeable

improvement in our mag. My favorite—I use the singular because of the unity-of-outlook of the three masters—is the mighty Heinlein-MacDonald-Hubbard triumvirate. I think Dr. Smith's critics have jumped on the old master with undue severity on the basis of one letdown. It is perfectly true that we had more coming from the author of the epics of the past than a mad Arisian and a new work-from-within stratagem, but let's remember Van Vogt's resurgence from the mediocrity of "Vault of the Beast" to his masterpieces in "Slan!" and "Asylum." Please, PLEASE, give us more Smith when the doctor is ready. Maybe you can get some of his stuff on "Storm" Cloud, the vortex blaster.

There seems to be one flaw which has grown worse rather than better as time goes on. I speak of the feeble endings of most of your serials and many of your shorts. My idea of a perfect ending is certainly inadequate, but I think that the best I have seen is the one from "Uncertainty." The suspicion has been growing that perhaps you have been getting work on assignments, and the endings have had to be rushed through. The ending of "Beyond This Horizon" is a case in point. This story has a structure worthy of three serial installments, possibly four, but it ends abruptly, unsatisfyingly, just when the full background has been painted in and the story has attained momentum. I might add here that science-fiction stories which place their action entirely on the Earth in the present geological epoch lose some of their punch as science-fiction, in that science-fiction's main theme is intelligence against the rest of the Universe and the present Earth—aside from war—is too friendly to human life.

My choices for the Analytical Laboratory are as follows—(1) "Secret Unattainable"; *too* timely! It gives the cold shivers! (2) "The Contraband Cow," (3) "Tools" (2 and 3 very close), (4) "Collision Orbit," (5) "Brimstone Bill." The stories from the Probability Zero department are hard to rate because they are not so far from the sort many of your rivals run habitually, and I don't think so much of the type. They go: (1) "The Floater," (2) "De Gustibus," (3) "The Mysterious Bomb Raid," (4) "The Strange Case of the Missing Hero."—James B. Dial, 5342 South Ellis Avenue, Chicago, Illinois.

THE END.



WEAPONS AND WAR

Continued from page 6

zero to far above the boiling point. But if you're working with delicate organic chemical reaction balances that require a temperature of 123° plus or minus not more than two degrees, the ton-lot method may strike nasty snags. Dump the substances into a big vat that will hold a ton or so—and you may find the well-cooled sides of the vat at about 90° while the center of the vat goes shooting up around 190°.

Or the undesirable side-products that showed up in the laboratory runs of the reaction, where the job was done in batches, may prove completely ruinous when the useful industrial plant tries to run the reaction as a continuous cyclic process.

In mechanics, parallel problems appear. Nature ran against the basic one a billion or so years ago, and has been working on it ever since. Elephants don't jump, and may be killed by a fall of twice their own height. Mice jump, and won't be damaged much by a fall of fifty times an elephant's height, let alone their own height. The strength of material increases as the cross section, but the weight and the inertia goes skyrocketing upward with the volume—which is a cubic, third-power function. You can drop a three-inch model tank, a perfect scale model, ten feet with no damage at all. Even thirty feet won't damage it. But a full-size machine will not stand that sort of thing any better than the full-size mammal, the elephant, will stand the treatment the model mammal, mouse, will. Mechanisms that work perfectly in the laboratory in model form completely fail to function in full-scale size, when massive metal has skyrocketed the inertia of the moving parts. Practically speaking, model mechanisms made of sheet and rod and bar

lead react somewhat as full-scale mechanisms made of the finest, toughest steels. Save, of course, that the lead model will bend and slump instead of breaking.

In electrical and radio apparatus the problems encountered are equally mean, but of a somewhat different nature. Normally, such laboratory apparatus is actually full-scale. An amplifier is built using tubes and condensers and lead-wire of the size actually to be used in service. But pretty frequently the test set-up will be strung around a laboratory using high-precision potentiometers for determining the optimum voltages, et cetera, superquality laboratory type mica-insulated condensers for determinations of exactly optimum capacities, and precision-wound coils. Special parts may well be tinkered up, constituting a magnificent "bugger-factor" in the set-up, since a highly skilled technician who knew exactly what he wanted the thing to do, worked on it, adjusted it, reworked, modified, corrected and patted it on its back when it performed. Perhaps, in the process, he introduced accidentally an impurity that made it function. Perhaps his imperfect workmanship—the hand cannot wind fine wires on a grid as evenly as a machine—produced a nonlinear resultant that made the gadget perfect instead of pretty good.

In production, those factors have to be licked out or balanced away, somehow. Too, it may be that the circuit is designed for use at ultrahigh frequencies. The variation in the capacity of a condenser with changes in barometric pressure can be wonderful and ruinous. Humidity changes do nasty things to leakage currents inside a sensitively balanced amplifier.

Licking the known basic science into shape takes months. Putting more men on the job speeds some projects—but many a metallurgical problem doesn't advance any faster for more men.

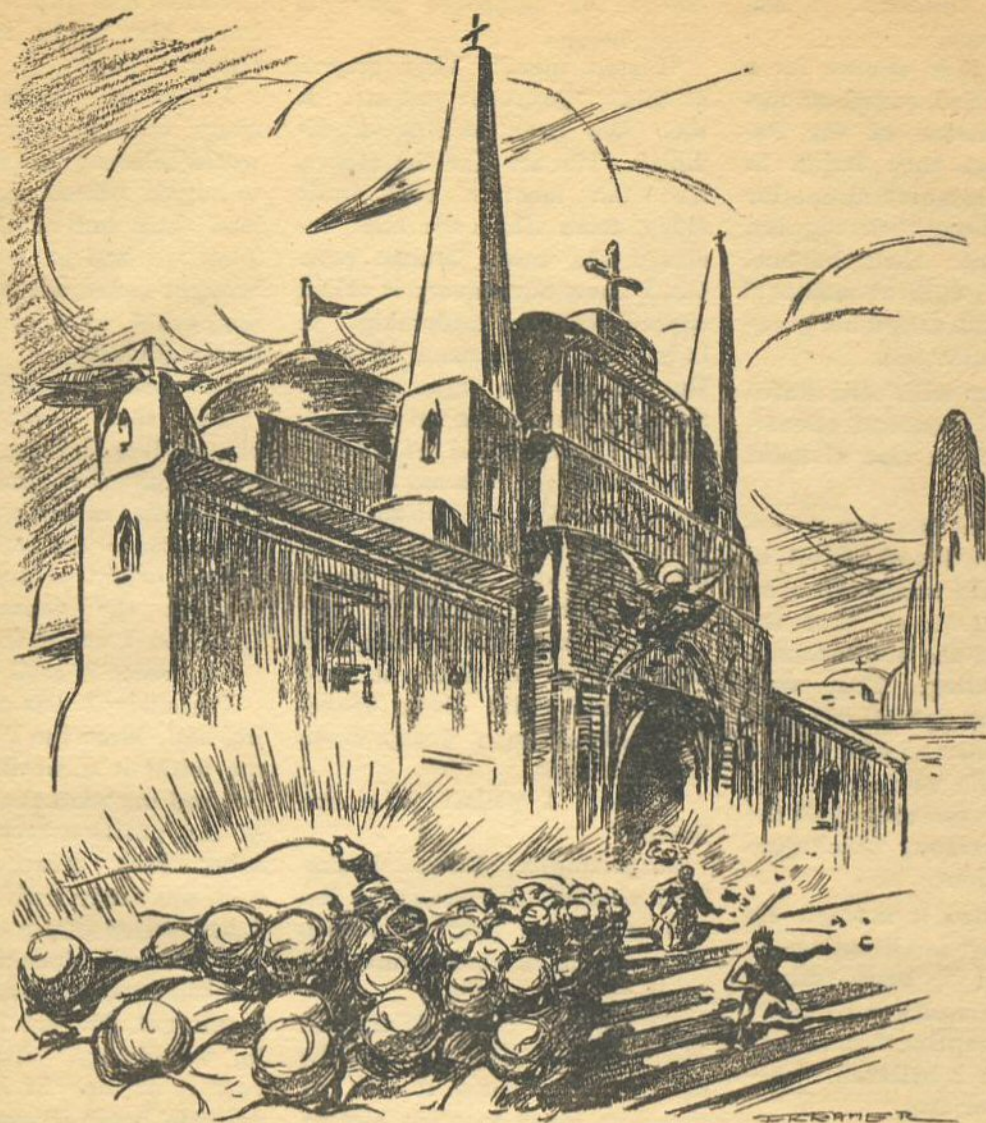
Age-hardening alloys, for instance, must needs stand at a given temperature for a given number of weeks and days. Then a further period of months at room or outdoor temperatures, both arctic and tropic, must be allowed to determine whether those age-hardening properties disappear embarrassingly. There is no such thing as accelerated tests for that sort of problem. Increasing temperature to hasten reactions works fine on some things—but the reaction at high temperature is not what's wanted here.

It takes time, and time alone can do it. The new weapons; the new mechanisms, the new processes, based on methods that are not common to the Axis and the United Nations, will emerge only gradually in the next year. In late 1943 and early 1944 they will really begin to accumulate. After that, the longer it goes, the greater will be the divergence of knowledge reduced to usable—power.

And, be it remembered, while a mechanism in functioning condition may fall into enemy hands, the greater the divergence of applied knowledge, the less the chance will be that the mechanism can be duplicated by the enemy. No amount of chemical or physical analysis will reveal the heat treatment technique used in producing a metal, unless you already know the alloy and produce it yourself. The capture of a tank of 120 octane gasoline will help very little in telling how it was produced. A piece of thoroughly polymerized and treated plastic may reveal its constituents, but the process of getting those constituents into that particular combine is something else.

Too, it's natural that the process grows as it goes. The more unshared science we have, the more interactions of techniques not common property will appear.

The Editor.



WITH FLAMING SWORDS

By Cleve Cartmill

● The accident that a new weapon killed some and mutated others produced—the Saints, the self-appointed, selfish, self-adulating Saints, who ruled the world with decidedly unsaintly violence and—with flaming swords.

Illustrated by F. Kramer

You could shock men, I thought, and suffer no consequences. Men were merely slaves. Slaves allowed to serve us, to bring their produce to

Eden, to give us their arms and backs and brains.

But these were Saints, here in the big hall. Their massed auras were a blaze of blue

against which I narrowed my eyes. We were Saints, with three hundred years of traditional conduct behind us.

And what I had said was not

condoned by tradition. I had called them men.

They took it in silence for a few seconds and stared at me, beside the throne of the Patriarch. Then they began to yell, and I felt a sick shame for them. They lost their dignity.

I yelled into their hubbub. "I invoke the rule of silence!"

The Patriarch raised his glowing arms. Quiet fell.

"Against my will," the Patriarch said, "I command silence. We will hear the rest of Saint Hanson's heresy."

That stopped me for a moment. I loved this old Saint, as did we all. He was so wise, so helpful at all times. For the others here in the auditorium I had little feeling. They were Saints, as I was, but all our lives and deeds centered around the Patriarch. His white robe and banded turban symbolized all the ritual and ceremony which governed our actions.

He had called it heresy. So strong was my conditioning, so carefully had I been trained from birth, so accustomed had I become to accepting his verdict as truth, that I believed him—for a second or two.

Heresy. That, if proved, was unforgivable. They could have my life for it. All of my work, and all of Jennings' would have been wasted. I thought of our efforts secondarily, though; primarily, I did not want to die. And I knew that I could die, in spite of our sham and hypocrisy about "ascension."

But I couldn't leave it at that, with just the accusation. A conviction that I was right would not let me back down. Nobody, not even the Patriarch, should stop me before I presented my argument.

I turned toward the Throne and faced him respectfully. "It is not heresy, your Reverence. It is truth. I have proof." His glowing face did not change expression. I spoke to the audience, narrowing my eyes again

before the collective glow of their auras.

"Listen, men." They gasped at this. "Yes, men you are. I, too. We have nothing of divinity. We are like the others, like the laborers who built Eden, from which we have enslaved the entire human race. Oh, I know our slavery is called supervision and leadership. It is imposed in the name of good. But we have no right to make servants of men, for we are men. Wait," I cautioned as several hands went up, "let me tell you the truth. We are set apart by our auras, but those auras are the result of disturbed germ plasma in our ancestors."

They refused to take this, rule of silence or no. They shouted again, and Saint Evan Wakefield led an angry group down the wide aisle.

"Quiet!" I yelled. "Let me finish!"

Surprisingly, Saint Wakefield checked the group he led and raised his long arms with their nimbus of blue. Quiet fell again.

"Brethren," Saint Wakefield said. "Saint Hanson mouths heresy. No doubt of it. He has given us cause to strip him of his robes and his turban. Even so, he deserves to be heard. But not here, not here; this meeting is too unwieldy." He addressed the Patriarch. "I suggest, your Reverence, that Saint Hanson meet with the High Council tomorrow. Perhaps that smaller group can restore his sanity. At any rate, it can make a comprehensive report with the Brethren."

"It is so ordered," the Patriarch said. "Go with good."

I watched them go, each with his blue radiance which even our desert sun could not entirely dim. I felt troubled, not because they muttered among themselves, but because Evan Wakefield looked thoughtfully at me for a long time. We had clashed before, on matters of

doctrine and procedure, and I knew him to be ruthless and clever.

I was one voice among so many millions, for the whole world believed that we were near to angels, placed among men to lead them out of the Collapse. That we had so led them and brought order out of chaos was final proof, in the popular mind, of our divinity.

One voice is easily silenced.

Oh, there were scattered others, like Jennings, but they had no power, no means. I had the means, in my apartment, to demonstrate the scientific, not divine, origin of our auras, but without the consent of the Brethren I could do nothing.

One voice is easily silenced.

Presently I was alone in the big hall. Even the Patriarch left me without a word. This impressed me with the seriousness of my position more than any other event. Always the Patriarch was ready with advice. But I had called him a man, and he had removed himself.

I could use some advice. From Jennings? No, for I knew what he would say. Attack. He'd roar it at me. If battle is inevitable, begin it yourself. Turn the modulator on the Council, wipe out their auras, and then tell them. That's what Jennings would advise.

But though I agreed with him in principle, I couldn't do it. They were Saints. I was a Saint. My conditioning was too strong. I couldn't trick them. It was not our way among ourselves. Trick men, yes. We did when necessary. But not each other.

I had to play fair, and I knew it. I was troubled enough by my secrecy. I hadn't told anybody, not even Jennings, that my modulator was finished and successful. Nobody knew of my laboratory adjoining my bedroom, not even Ellen.

Perhaps, I thought, if I tell the Patriarch what I've done, he will advise me. That wise old man will know what to do. I

was a trifle shocked at my thinking of him as a man. That was the first time it had been in my thoughts.

I hurried up the aisle and out on the steps.

He was not in sight on the broad, sloping flight that went down to the river we had made. I went around the gleaming administration buildings, examining each street that stretched, spokewise from this administration center of the circular island which was the inner city. Saints aplenty were on the streets, and a few were on one of the bridges which connected us with the outer city where our "slaves" lived, but the high banded turban of the Patriarch was nowhere to be seen.

I decided not to search. I could waste the whole day. He might even have taken his plane from the landing tower. He could be in Los Angeles or San Francisco by now, or well on his way to New York. Or anywhere. Even Shanghai, where his mother lived. He visited her every few days.

So I went to my apartment. I could call the Patriarch from there, wherever he might be. En route I walked alone. My fellow Saints didn't see me. They looked through me. I had the feeling that I was invisible, like an "ascended" Saint. I was here, among the others, but they couldn't see me.

Loneliness is frightening. Invisibility must be the height of loneliness. You can see, hear, smell, but you can't communicate. To be stranded on some tiny fleck of land in the sea is not as bad as being ignored by everyone. There, you know what your battle is, simple survival. But here, with eyes resting on me briefly but blankly, I had a fleeting doubt of my existence, a fleeting belief in ascension.

But a tele-technician, rounding a corner, glanced at me and covered his eyes with a respect-

ful arm as I passed. I was alive, then. I was in coventry, but I was alive. I felt like singing as I turned into my apartment.

Ellen was there, and my heart bounced at sight of her golden beauty. She was like that. Gold. Her green eyes were flecked with it, her skin a paler hue, and her hair an aureate helmet.

She covered her eyes with a pale forearm as I entered, and stood and bent her knee.

"Stop that!" I said.

She obeyed, but her eyes were cast down. I lifted her chin in my hand and looked at her. Presently a tremulous smile flickered on her broad mouth, and I kissed it to life. She submitted. No more than that. A little flame of anger licked at my heart, but I said nothing. Plenty of time for that after we were married.

"It's nice of you to call, Ellen. Can I offer you anything? Food, drink?"

"No, your Reverence. Thank you."

"Don't call me that, Ellen. My name is Robert."

"But I can't!" she cried. "It's familiar, and wicked."

"How do you expect to address me when we're married?"

"With reverence, with respect, as a Saint should always be addressed."

"A man wants intimacy, and friendship, and love, not reverence, from his wife."

"Oh, don't call yourself a man!" she pleaded. "It's—blasphemy."

I looked at her. Her eyes sparkled, like ice in sunlight, but the sparkle was from moistness. She was near to tears.

"Sit down, Ellen." She did, on the couch. "Say, 'Yes, Robert.'"

"Please," she begged. "Let me tell you why I'm here, first."

"Say, 'Yes, Robert.'"

"Yes—Rob— Oh, I can't! Let me tell you. Saint Wakefield—"

"He sent you?"

"Yes. He asked me to dissuade you in what he called your mad scheme. He called me. I came at once. My plane is on the roof."

So this was Wakefield's first move. It was a weak move, because Ellen couldn't stop me. I loved her. I loved her very much, but I wanted a wife, not a worshiper.

"Go home, Ellen."

"Please listen to me, your Reverence. I don't presume to question what you are doing, for I haven't the intelligence—"

"You're as intelligent as I am," I snapped.

She was shocked. "Oh, no! I am only mortal. I can die."

"And I can die." Her eyes popped, and I betrayed the Brethren. "You may as well know," I said, "because the world will know soon. Saints do not 'ascend.' They die. There is a secret crypt. Several hundred are buried there. We are men."

"No," she whispered. "No."

"Yes. Listen. Here is the truth. Nearly three hundred years ago, a new weapon was introduced into warfare. It was fired only once. The destruction was so great and terrible that nations by common consent outlawed it, for it destroyed friend and foe indiscriminately. Thousands were killed within the radius of its effect. It was silent death, for the gun was a ray gun. But listen. On the edge of that area of destruction, people were affected by that ray. Their germ plasm was affected so that male children born of those individuals were born with an aura. Do you know anything of genetics?"

"No."

"I don't know much. My line is radiant frequencies, as you know. But I'll give you the gist, as a geneticist gave it to be. Nature altered the germ plasm as a defense against the L ray. For some reason not clear even to my informant, the

defense mechanism manifests itself in males by a glow. Each blood cell has a luminescent nucleus, so to speak. Female children have the same resistance to the L ray, but they don't glow. I don't know why, any more than I know why hemophilia passes through the female only. But there it is. That's the truth."

She was quiet for a moment. Then she quoted a phrase from the Codex. "'And in the midst of chaos, the Saints appeared. They showed the way, and peace once more lay on the land.'"

I shook my head. I had pity for her, and for all the others. The tale of those glowing boy children ran through my mind, how ignorant, ordinary parents eyed the nimbus of their child with awe and fear. I knew. It had happened to me, in a sense.

The fear was gone, by the time I was born. My father and grandfather had glowed before me, and they felt none of that first superstition. By that time, the Codex had been written, rules had been laid down, and the Saints ruled the world from their new Eden. But the ordinary citizen reflected the ancient awe. They flung up their arms, and ordinary little boys were afraid to play with me.

"I wanted to play," I said to Ellen, "when I was a kid. But I was a Saint, and set apart. I went to school with other little Saints, and we were not allowed to play. We had to learn so much. So many things to know, so little time to learn. We were lonely little boys. I knew, even then, I was like the others."

"No," she said. She had one pale hand across her vivid mouth in a gesture of—fear? Despair? A little of each, perhaps.

"And now," I said, "I want an ordinary life. But belief and faith have made me a superman. That, and something else which I have sworn not to reveal. You see, Ellen, I know the whole shabby farce, the trickery, the

mystery. And I am rebelling. They may kill me, but I'll prove my point. We are merely men. Supermen, while you and the others believe. But if that belief is shattered, we are ordinary, and may find happiness."

"Please believe that you are wrong, your Reverence. Even if you're right, you're wrong. You will destroy faith. That's all we have, our faith. Take it away, and what will become of us? Have you thought of that?"

"Yes, Ellen. Listen. Once upon a time a man could call his soul his own. He defended his liberty down to the last breath. Then a series of dictatorships made liberty a remembered word that had no meaning any more. Then, chaos. Then, Saints. It was natural that they should make their own dictatorship, for the world had been conditioned for five hundred years to that. So men are slaves again. But listen, Ellen. You didn't learn this in school, because you are not a Saint, but men were happy once. They laughed, and they battled adversity with high hearts. Do you hear laughter anywhere?"

"Why, yes. Children play games."

"For a brief period, I'll grant you, children have a taste of laughter. But away from home, only. I've watched them. They don't laugh in their homes. How could they? How can a home be happy when, at any time he chooses, any Saint can walk into any home in the world and take what he chooses, wife, child, or chattel?"

"But that is his due," she protested. "Any such home is honored."

"You may not know this word, Ellen, but it's self-explanatory. Phooey! Here's another. Nuts!"

She gasped at this. I tried another tack.

"Do you love me, Ellen?"

"Naturally," she answered. "You will choose me at the next Festival."

"But is it *me* you love? Rob-

ert Hanson? Would you love me if I were the boy next door, and not a Saint?"

She couldn't see it. She couldn't see me, under my robe and turban. She just looked at me helplessly.

"Go home, Ellen," I said gently. "Some day, you'll see what I mean, maybe. I want an ordinary home, and ordinary kids. I love you as a man should love a woman. You are a person, I am a person. We're equal."

On her gasp, Evan Wakefield entered. He shot a quick glance at Ellen, and apparently read her expression correctly.

"You may go now," he said crisply.

"Here, wait!" I said. "She isn't a piece of furniture, to be shoved around."

"She is female," he reminded me.

"Yes," I sighed. "I can't break that tradition in a breath." I turned to Ellen. "Thank you, my dear, for coming. Think over what I have told you."

She bent the knee to us both, and went out to the levitator. In a few seconds, the gong on my wall announced that she had taken off.

Saint Wakefield sat in the biggest chair, almost overflowing it. He folded his powerful hands and looked at me with an expression of kindly concern.

"Brother," he said, "I'm worried about you. I want to help."

"Do you want to help the world?"

"Of course. Always."

"Then help me put an end to this sham and hypocrisy. I have the means, but I can use help."

He frowned. "I don't understand," he murmured.

I told him what I had told Ellen, but in more detail.

"I think the Saints are honest in their belief," I said. "But the proof of my contention lies in our actions. The lie about ascension. You know we can die. Then there's the lie about

a Saint's lethal wrath, our most carefully guarded secret."

"Don't speak it," he whispered.

I ignored this. "Each of us carries a ray gun in his turban. How do you suppose the people would feel if they knew we scotch rebellion or irreverence by touching the button on our robe, that it isn't righteous wrath which causes them to fall dead?"

"I beg you," he said. "Stop."

"Why? I tell you, these things are proof of our mortality. Superstition and fear made us angels, and we believed, because we were children. We believed so strongly that we ascribed supernatural factors to events we could not otherwise explain. The ignorant said that a Saint cannot die. So we rigged up a secret burying place, and called death ascension."

"I'll admit," he said, "that we can't explain what is apparently death, but the ascension story is in the interest of common good. People would be unhappy if they thought we could die."

"And so they're enslaved because they think we cannot. They forgot the big gun by the time the first child was born with an aura. It didn't occur to anybody that his parents had been in a restricted area when the gun was fired. It didn't occur to anybody that his parents were religious fanatics. The fact of his aura was proof enough of divinity. But he knew, the first Patriarch knew he was an impostor."

Evan Wakefield's blue eyes hardened. "You can be put to death by that statement," he said grimly.

"Not if I can back it up," I said. "Listen, man, I'm not spouting theory. I have facts. But one more point about the first Patriarch. If he didn't know, then why did he study the L ray, why did he secrete a miniature gun in his turban, as we do today? Why did he kill

thousands of scoffers, and call his weapon righteous wrath? Maybe he thought he was acting for the best, but his action proves he knew he was a fraud."

Wakefield got to his feet, towered over me. "You're insane," he said. "You can't destroy the very foundations of our civilization. Right or wrong, you can't destroy these."

"They were destroyed before," I pointed out.

"And the Saints built them again. Surely that's worth something. In fact, everything."

"It has served its end. What we have now is a culture of master and slave. Oh, we treat them well enough. We must keep our animals healthy. But they can't call their breath their own, because we can take it away if we don't like the part in their hair. And we're no better than they."

"Stop this, Saint Hanson!"

"Like hell I'll stop it! I have worked with a man, a scientist, in collecting proof. I know that our auras can be destroyed by scientific means. If those auras were truly divine, nothing man-made could destroy them."

"How do you know this?"

"I'll show you, presently."

"Who was this man? Jennings?"

"No," I lied. "I won't tell his name."

Wakefield diverged for a moment. "Magda Jennings," he said softly. "I shall choose her at the Festival."

"But she's his wife! They're very happy."

"She's beautiful," he said.

"That's part of what I mean," I said grimly. "Don't you feel shame at robbing a man of . . . of *anything*, regardless?"

Maybe his bewilderment was honest, I don't know. But it seemed honest. He stared at me.

"But I'm a Saint," he said.

"All right," I grunted. "I'll show you. Come in here."

He followed into my bedroom.

I slid back the wall panel and went into my laboratory. I looked at the modulator with pride of achievement, the pride which comes from having made something with your own hands. It was so compact, so neat, so efficient.

I took a slide from the temperature chest and slid it under a microscope. "Look. This slide has specimens of my own blood cells. You can see the glow."

He applied himself to the eyepiece. "Yes."

"Keep looking while I adjust the modulator. That glow was caused originally by a radiant frequency. It can be destroyed by a counter frequency which this machine will generate. Keep looking."

I adjusted the modulator and turned the rheostat. He raised a white face presently.

"It vanished," he whispered.

"I haven't tried it on a Saint yet," I said. "But it will do the same to us. That, I contend, is final proof."

"Yes," he said reflectively. "It seems to be. Well! This needs some thinking. How does this machine work?"

I showed him the simple controls.

I trusted him, even though I differed with him. He was a Saint. We do not trick each other.

He turned it on me, wrenched the rheostat far over.

My aura winked out.

I hadn't expected this. I was stunned, long enough for him to raise the modulator high in both hands. Before he could fling it to the tile floor, I leaped at him.

"You devil! You shan't!"

But he was so large, so much stronger. I did some damage, I suppose, but he kicked me into a corner, into semi-consciousness. Through a blur of pain I saw him smash the modulator, and throw the wreckage into the waste chute. He leaped back

and slammed the door against the atomic blast which sprang to life and consumed my machine.

He looked down at me. "That takes care of that. I'll see you at Council meeting tomorrow—ah, Saint!"

My first thought after Wakefield left me was of what Jennings would say. He would call me a fool. And so I was, a trusting fool. I had allowed myself to be tricked.

Then a sensation of nakedness knifed through me. My aura was gone. Destroying it hadn't hurt, at the time. But now it hurt. Never had I imagined how it would feel.

I had thought of it many times, of course. But I couldn't have imagined this desolation, this despair, this shame of facing men. They wouldn't cover their eyes, now. They wouldn't bend the knee.

Pain from the beating and kicking Wakefield had given me hardly registered in my churn-

ing skull as I went bitterly to bed. Tomorrow I must face the Council, and that meant going along some of the streets in my new unglowing nakedness.

And I did. I skulked the first few blocks, but such men as I saw—street laborers, technicians and shopkeepers—covered their eyes as if I had not changed. My robe and turban marked me as a Saint. Their reactions were so deeply ingrained that perhaps they saw an aura.

I walked boldly then, and as I mounted the long reach of wide steps I felt that I had triumphed. For my condition, and the manner in which it was brought about, was proof of mortality, proof that we were not divine.

We were men, as the Council should see. Being wise men, they would end this psychological farce which made us slave owners, and all men should be equal again.

I thought this with a high heart, and hurried. But the in-

stant I entered the Council chamber, Wakefield looked at me in horror, pointed a quivering finger, and leaped to his feet.

"Divine justice!" he said. "Look, brethren! God has punished him!"

He waited for them to look, but hurried on with his analysis and accusation.

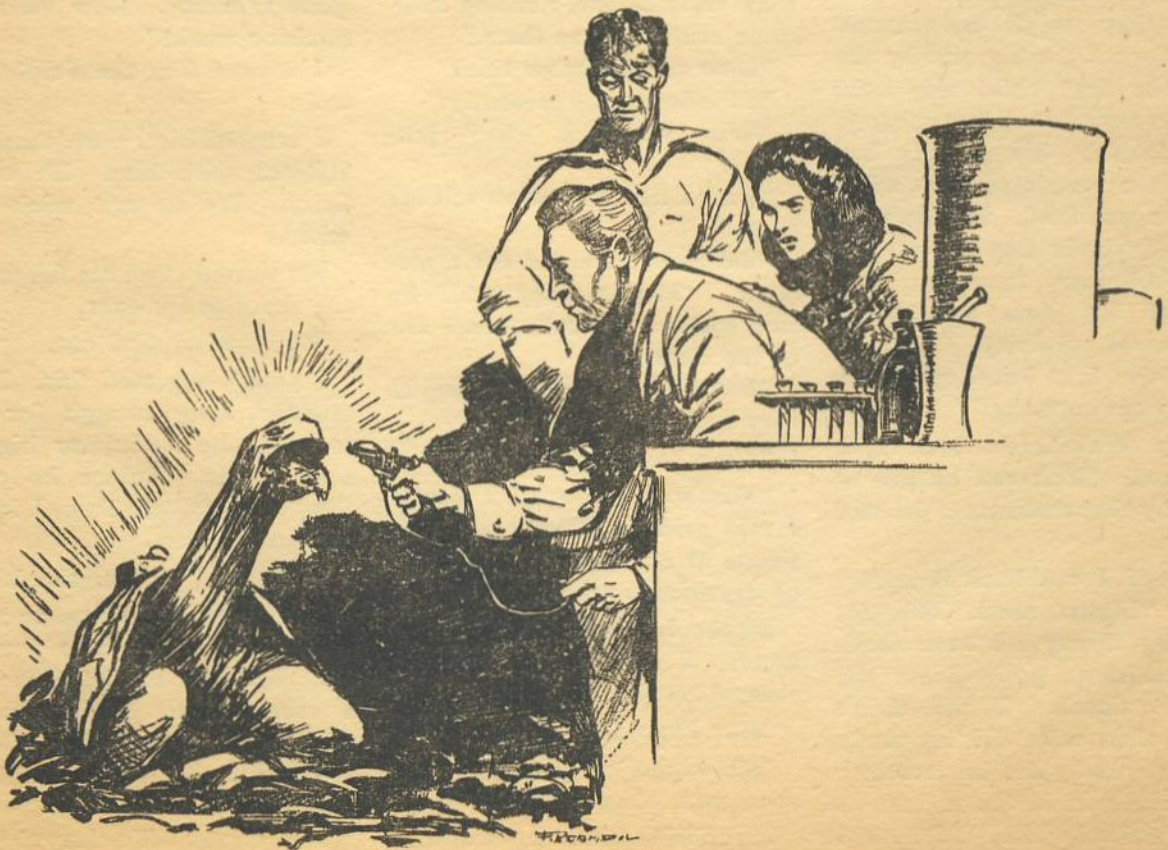
I blurted something—anything—but the Patriarch waved me to silence. Then I felt like crying, as I had seen men break into tears before sentence was passed on them, for it was too late to say anything.

II.

I was allowed to defend myself before the Council. Oh, yes, I was given a chance to speak—after Wakefield. I don't know how I looked; I know how I felt.

I had knots in my stomach. I had a hurt somewhere in my throat. I had a tightness in my ears. I had bitterness.

"I have nothing to say," I told



the Patriarch and the half-dozen Saints.

"Then you admit," the Patriarch asked kindly, "that you spoke heresy, and God removed your aura as punishment?"

What could I say? It was my word against Wakefield's. I hadn't told anybody of my modulator. I hadn't showed it. Of course, Jennings knew I was working on it, but he was a man. His word was worth nothing here. Ellen knew Wakefield had been at my apartment, but she was female.

"I admit nothing," I said. "I can only threaten, and that seems pointless."

"It seems self-evident," the Patriarch continued, "that your blasphemy has been rewarded justly. Here is an example for unbelievers."

Unbelievers? He had said it. I knew nothing of unbelievers, except for isolated cases such as Jennings and myself. Unbelievers? What was this?

"I suggest," the Patriarch continued, "that a public ceremony is in order. An excommunication, so to speak. Hanson is now neither man nor Saint, and cannot live in either world. He must be driven out, with scourges."

The Council didn't understand. The Patriarch explained.

"We have no precedent, true," he admitted. "Nor have we any previous instance of falling so from this estate. We shall bring it to the world's attention."

It didn't take long for the set-up. They called in all the Saints, massed them in the auditorium. I stood again on the platform, but this time I was the only one present who had no aura—until the technicians came with telaudiview screens and equipment.

The general public, of course, was not admitted, but the whole world saw the ceremony. From Kamchatka to Kalamazoo, from Capetown to Chung King, from Sydney to Siberia, they saw and heard on their telescreens.

The Patriarch officiated.

"Robert Hanson," he said solemnly, "for twenty-eight years you have been a Saint. You blasphemed, questioned your own divinity, raised a doubting voice. And therefore, in the natural course of events, divine wrath stripped your symbol of office from your unworthy body. You have no aura. Because of your former estate, you are not a man. Because of your present lack, you are no longer a Saint. You shall be driven out, scourged to a life without hope of salvation."

He addressed the screen, solemnly, his organlike voice rolling through stirring phrases. "Men! All men everywhere, hearken! This poor one, Robert Hanson, shall walk henceforth alone. No voice shall be raised in his defense. No hand shall give him aid, no heart shall bleed, no eyes shall see, no ears shall listen. He is unworthy. His spirit is unclean, and none shall make him unafraid. Let him scabble for his life. Let him find shelter in the storm itself, in the blazing sun, and let the night cover him with blankets of bitter cold. He is alone. Alone, until death shall claim his worthless soul and torture it in hell forever and forever."

He pulled off my turban, without checking on whether my ray gun was still there. He stripped off my robe. I stood practically naked before the Saints. I don't suppose any greater humiliation exists than to be stripped before an elaborately dressed group. I felt about four inches high, for the ceremony had now picked up a life of its own. Its sonorous rhythm, its grim solemnity, its religious simplicity had caught me up.

"Out!" cried the Patriarch. "Drive him out!"

They didn't hurt me. The Council had flimsy little whips, and they just tapped my bare shoulders. But the symbolism was terrifying.

Down the aisle I led this pro-

cession. With measured beat they laid the scourges across my back, and they chanted: "Out. Out. Out. Out."

The world watched, for the scanners followed and sent their images across the horizons.

Out of the temple, onto the steps which were packed with those who lived in the outer city. The temple door swung shut at my back, and I faced a long gantlet of grim faces.

Somebody threw a stone. Another. I don't know why. I suspect smoldering resentment of their masters prompted it. Then the air was full of missiles, and I ran down the long steps. I was not going to let them kill me. Not this way, like a dog.

I didn't try to dodge. I just ran, blindly. Perhaps that was wisest. I don't know. Stones, sticks, and other solid objects left my body welted with bruises, and blood. But if I had tried to dodge, to twist and weave, perhaps they'd have killed me. They'd have caught me, at any rate. As it was they were breathing on my neck as I ran across a bridge into the outer city into the maze of little streets.

Somehow, I got away. Not consciously, not by shrewdness, because I didn't care. I was out on my feet, with the voice of the crowd only a vague roar in my ears. I was not conscious of this dying away down another alley, for the roar of my blood drowned all other sound. I fell into a little lane, and crawled under a house.

I don't know what happened after that.

The room where I opened my eyes had a familiar look. So did the voice that bellowed at me have a familiar sound.

"Bob! They damned near did you in. Magda!" Jennings yelled. "Bring the poor devil some soup. Or something equally loathsome."

I rolled my eyes toward the

voice. He was in white, stripping off rubber gloves. His slate-gray eyes were cold, although his massive face was twisted in a grin at me.

"What was the matter with you?" he demanded. "You ran like you had a broken leg. I could have caught you at any time."

"Were you in that crowd?" I demanded.

"Certainly. Somebody had to lead the fools down a blind alley. I had a hell of a time holding them back."

"I suppose you accounted for some of these bruises, too."

"Nope. I missed you. Oh, I threw my share, but mostly I hit some of the other slaves."

Magda came in, as dark as he was blond. She carried a bowl in her slender dark hands.

"Hello, stupid," she said. "Get outside of this gupp. It'll put blood in your veins."

They salved me and fed me, and listened to my tale.

"Too bad for us," Jennings said, "if you're caught here. Maybe we'd better rub him out, eh, Magda?"

"It'd be safer," she agreed. "How do you want to die, Bob?"

"Smothered in kisses, no doubt," Jennings answered. "Well, you ought to be able to travel."

"Are we traveling?"

"Hell, yes. I don't want some filthy Saint walking in here and finding you. Wakefield, for example."

I sat up on the bed. "Wakefield," I said. "He'll choose you, Magda, at the Festival."

Neither of them said anything. Jennings moved over and touched his wife. He touched her with his fingers—her blue-black hair, her olive face, her eyelids. She just stared, empty-eyed, at the floor. Her hands clenched, but she didn't clutch at Jennings, she didn't cling.

Presently: "Drink up, Bob," she said. "We'd better go."

"But where? You can't hide from the Saints."

"We can," Jennings said. "Do you think I've done nothing but putter since you gave me your ray gun to experiment on germ plasm? I may be a scientist, Bob, but I'm a man, too. I made my preparations. I saw the day coming when we should wipe out the bloody Saints. We're ready to go to work."

"With one ray gun," I asked, "you intend to wipe out the Saints? They're immune to it."

"This is no place to work out strategy," he snapped. "We haven't time. Snap into it. Here's a pair of pants. Magda, get him some sandals."

They went into action. While Magda went into another room after clothes, Jennings started packing laboratory equipment.

"But how can you leave?" I called through the door. "If a patrol plane stops you, you have no permission to show."

He laughed grimly. "We're not going by plane. Why did you think I want you to wear sandals? I don't give a damn whether you're fashionable or not. But I don't want to have to carry you because your feet start bleeding."

A gong sounded a mellow note, and Jennings came to the door. His eyes were slitted, his face grim.

"Come here!" he whispered fiercely. "Hurry!"

I leaped off the bed and ran to him in my bare feet. He grabbed one of my arms, yanked me to the waste chute door.

"Crawl in there," he whispered.

I drew back. "I'll be burned to a crisp."

"Don't argue, you fool! This is a blind. It doesn't work. Get in, feet first. There are hand holds. Hang on till I let you out."

When I was in the chute, hanging to short rods in utter darkness, I reflected that Jennings was a man you obeyed. He had pushed me around since that day I'd met him, when he

didn't put an arm across his eyes in salute.

He had completed his historical research on that day, and in the flush of knowledge was contemptuous of Saints. It was fortunate I had been the Saint he insulted. Others, like Wakefield, would have killed him without asking questions. But I had asked, and he had told me. We had become friends. The only friend, I thought, I had ever had.

I had given him my ray gun for experiments on germ plasm. These had confirmed his theory that Saints were men. Men with an aura, yes, but men. Nature had provided the aura as a defense. And nature, not knowing that the ray gun had been outlawed, continued to pass that defense from one generation to the next.

I cursed myself a little, there in the darkness. I had worked secretly and alone, and had failed. One voice is so easily silenced. What now?

Voices filtered through the pyrolite door. One belonged to Wakefield.

"You are packing?" he asked.

"To fumigate my laboratory, your Reverence," Jennings answered. "Some stray substance came into the damned place, and I've got to clean it out before I can go on with my experiments."

"I see. Where did Magda go? I didn't see her as I came in."

"Shopping, your Reverence. You know how women are."

"Hm-m-m, yes. Where is Robert Hanson?"

"I don't know, your Reverence."

"Don't lie to me, Jennings."

"No, your Reverence."

"I have reason to suspect that you are connected with a group of unbelievers, Jennings. If anyone would shelter Hanson, that group would."

"But I saw the ceremony, your Reverence. I obey. And I know nothing of unbelievers."

There was a long silence.

Wakefield finally broke it.

"For your sake, I hope that is true. Hanson escaped. I can tell you, and all men, that he will be hunted down. Some man shelters him. That man and all others associated with him will be put to death. Do you understand?"

There was another silence.

Then: "Be very good to Magda, Jennings," Wakefield remarked casually. "For I will choose her at the Festival."

This time, the silence became painful.

"Did you hear me?" Wakefield snapped.

"Yes—your—Reverence."

"Your attitude," Wakefield said thoughtfully, "is not as respectful as it should be. Take care, man, lest I loose my wrath, and you die."

Footsteps died away, and presently the thin note of a gong came to me. Footsteps came again, and the door was jerked open. Jennings didn't look at me.

"Come on," he said abstractedly.

I crawled out, brushed the dust of the chute from my bandages. He watched, but he didn't see me. His eyes were wide and blank. Then he came to with a start, and grinned.

"How did you like our priest hole, Bob?"

"Is that what you call it?"

"It's a prehistoric term. Came from England, when some faction tried to exterminate some kind of religious group, called priests. Citizens hid them, and called the hiding place a priest hole. Magda!" he roared. "Where are those clothes?"

She came in, her dark eyes apprehensive, fearful. She had clothes for me, and I slipped them on. She examined me when I was dressed, and, still with the faraway look, said:

"You're very good-looking, Bob. I hardly know you, without your trappings."

"Stop jabbering," Jennings said. "I've got enough compe-

tion, without your luring others under your spell. Help me, both of you. It'll be dark in an hour. We've got to be on our way."

We slipped out, packs strapped to our shoulders. Magda was dressed like us, in shorts, shirt, and hat. We were three men, apparently, cloaked in the irrigation fog which the weather bureau was already blowing across the city.

Once, a patrol plane slipped silently above us, and we froze in a shadow. It went on, and no voice hailed us. We marched, and were on the desert in a few hours, where there were no voices, except those of coyotes, to hail us. For a little while, we felt safe.

III.

In that air-conditioned cave in the Mojave Desert, I learned a number of things. Chief among these was that man will sacrifice whatever he has to regain lost freedom.

I had heard two hints of an underground movement. Here I met its leaders. Most of them were from this continent, but they came from all over the world. They came by plane, for they could get permission. But they slipped in at night, stayed for a few hours, and proceeded to the destination marked on their pass and checked in at the nearest monitor's office.

There was Thompson, tall, lathic, with one eye and hard hands. He was from the South, representing three hundred who chafed under the yoke of supervision.

There was Koto, the dumpy Mongolian whose daughter had been taken by a Saint for a house servant.

And Billings, whose wife had been chosen at a Festival.

And Donjian, who had wanted his son to be a scientist but had watched him follow a Saint to be a body servant.

And Miss Blake, whose fiancé

had not seen the Saint who killed him for not saluting.

And others. They slipped through the camouflaged cave entrance to hear the thrilling news that Saints were mortal. I was exhibited. They were friendly, though somewhat aloof, and they hurried away to spread the word.

All this was done at night, of course, for patrol planes passed over during the day. We had seen them on the first day, far out on the horizon, circling like black buzzards, searching.

"They're looking for us," Jennings said when he spotted the first. "Magda! Turn on a screen. Let's see what the news is."

We adjourned to the central chamber, and looked at the big screen while each of our images appeared.

"This is Robert Hanson," the announcer said. "Look at him closely. This is the way he appeared as a Saint. And this, after he lost his aura for heretical statements. All persons take warning. Robert Hanson is believed to be alive. If he is sheltered in any house, fed by any hand, or helped in any way, those who give him aid shall die."

Jennings and Magda appeared together on the screen.

"This is Jennings and his woman. He did not report to his local monitor today. When his quarters were searched, they were found empty. But spots of blood and a discarded bandage in a secret hiding place indicated that someone had been wounded. It is believed that they may have sheltered Robert Hanson. The same prohibitions apply to them as to Robert Hanson. Any person giving information of their whereabouts will be rewarded. If a man, he will receive a pass exempting him from reporting to any monitor for thirty days. If a female, she may be among the first candidates offered to the Saints at the coming Festival."

Magda shuddered. "That's a pretty reward."

"Hell," said her husband, "it is for most women. You're a little brighter, because you married me."

"Ha!" she scoffed. "A fat lot I learned from you, except to jump when you call. And that's plenty."

"Turn off that damned screen. They're showing the thing over again."

As this blond giant and his wife bickered in this friendly fashion, I forgot that I was being hunted. Nobody had ever spoken to me like that, and I missed it suddenly. All those years of being set apart rushed over me again. I wanted to be on terms of tender contempt with someone. Perhaps that would be possible with Ellen, now.

I came back to the cave. "I've got you in trouble," I said. "I'm sorry."

"Let us worry about it, Bob. Magda and I knew something like this would happen some day."

"The odds are pretty big, Jennings. We haven't any weapons. Except one ray gun, to which the Saints are immune."

"We'll find one, Bob. We're as smart as they are. Smarter, in our specialized fields."

Magda stood and looked at her husband steadily. She was grim. "Listen, if you mean what I think you do, the deal is off. How are you going to find a weapon which will kill a Saint without experimenting on Bob? You can't do that. I put my foot down, right now!"

I gaped a little. Women didn't talk like that. Oh, in banter, maybe. But she was serious.

Jennings was placating, to my further surprise. "Of course we won't experiment on him, honey. We need his specialized knowledge. I'll want a little of his blood to see if he's still immune since he lost his aura. That's very important."

"Why?"

"It'll decide whether we take the long or short view."

His voice held an ominous note, but he wouldn't amplify any further. I was a little uneasy, but anxious to get into action.

"Let's do it now," I said. "If those planes really were searching for you, we may not have too much time. Why do you think they were, anyway?"

"Why else would they drift along so close to the earth? It'd be natural for 'em to look around out here. I've done a lot of work on the protective hereditary characteristics of desert life. That's what got me to checking the Saints, in fact. One day I suddenly thought—"

"You thought?" Magda flared. "I was the one who thought, you big ape. I said suppose something had happened a long time ago to ancestors of the Saints, and a protective mutation occurred."

"So you did, so you did, babe. Not that it matters. I ran down the history on more than a hundred, and knew that's what happened. But anyway, those planes are searching for us, all right. This country was my stamping ground for a long time. We don't have any fires in the daytime. No smoke of any kind, and we don't poke our heads out. Let's get to work, Bob."

We went into his laboratory, paneled with gloflex, gleaming antiseptically at a few degrees above zero. We put on smocks and gloves, after sterilizing our arms, and put some of my blood on a slide.

Jennings took the turban gun from a small wall recess and adjusted the nozzle so that a very few rays could slip through the neutronium screen. He held it near the slide, and pressed the activator button.

He examined the slide, and looked at me thoughtfully.

"Bob, you've told me several times that what you wanted most from life is to be an ordinary

man with an ordinary home and ordinary kids."

"Well?"

"Just how strong is that particular selfishness?"

I frowned and went over to the microscope. "Let me look."

The luminescence was gone, as I knew. But the ray gun had not disintegrated the blood cells. There was no breakdown. I was still immune.

I looked at Jennings. "Well?"

"We need you, Bob. We need your brain, and your experience in radiant frequencies. So I want to know where you stand. This means that we must wipe out all the Saints. All."

"Including me?"

"Including you."

"I don't want to die, Jennings."

He grinned. "Wasn't thinking of it. What we've got to stop is the birth of any more Saints. Sterilization."

I walked around the laboratory, not really seeing the shining instruments and equipment, the specimen jars. Since I had learned from Jennings that I was only a man, one thought had been driving me—normalcy. I wanted it. I wanted it more than I wanted to see the Saints' domination ended, for it was a personal desire. The other was idealistic.

"Why should you expect me to help you," I asked, "when by so doing I commit suicide?"

"But you won't die," he protested.

"The name of Hanson will die. I feel a pride in the name. I want it to live."

"It will, Bob. People will remember it forever as the name that emancipated the human race."

"A name on a plate, or a statue. It isn't good enough."

"You won't help?"

"I don't know what you want me to do."

He explained. A synthetic protection against the L ray, so that the underground could overpower the Saints on Festi-



val day. All the Saints would be massed in Eden, and accessible.

"We have equipment, time, and opportunity here, Bob. Maybe you could work out something. Sort of the opposite of your modulator."

Even as he talked, I began thinking of formulas, and induction ratios.

"It may be possible," I said, "and it seems good strategy. On this other business, though. Listen, I don't have an aura. There's no reason to suppose my children will have."

"We can't take a chance, Bob. Suppose you make another modulator, and we remove all the auras, Saints and children

alike. We'd have to wait a whole year before we could be sure that no more children would be born with auras. Inside a year, those who still weren't convinced could band together. If the next generation glowed, the believers would do battle. We could easily have another collapse, and blood all over the streets."

"We could form a defense, too," I said.

"Granted. But what about throw-backs. Suppose a kid is born a hundred years from now who has an aura. If conditions at that time should be ripe for a renaissance, the race would be shackled again by superstition and fear."

I wanted to be honest with him. I had to be. He was my friend.

"I'll tell you," I said. "I won't promise anything. I want to think it over."

"But listen, Bob," he began.

Magda interrupted us. She came quickly through the door, alarm tensing her dark face.

"Shh!" she cautioned. "Somebody's coming through the entrance."

"Lights?" Jennings snapped.

"I turned them off," she answered.

He touched a button, and the laboratory was in thick darkness. My first reaction was a feeling of sadness. I couldn't light my own way in the dark any more.

Jennings slipped out softly through the door, turban gun in one hand, flashlight in the other. We crept after him, through the central chamber along a tunnel until we could hear the rustlings at the entrance. We crouched motionless, listening.

The sounds came nearer, as if a body were wriggling through the camouflage of sagebrush and mesquite. Jennings leveled flashlight and ray gun.

The beam cut a flaring cone out of the blackness, and framed a head and face at the far end. This was an incredibly ancient face, with generations of wrinkles all but burying its beady eyes. The head was as large as my two fists, and it was some seconds before we identified it. A huge desert terrapin.

"I thought it was out of some prehistoric nightmare," Magda chuckled with relief. "Come on in, Methuselah. Welcome to our study club."

"There's your guinea pig, Bob," Jennings said. "You can experiment on him."

IV.

As the days slipped by, the search for us must have become a source of embarrassment to the Saints, for there was no further mention of it on the telaudioview after the first week. The search continued, though. The planes circled closer each day, drifting with the wind.

We watched, now and then, when they landed to search a patch of desert brush, or one of the great rock monoliths which jutted from the desert floor.

Our cave had been located and dug with cunning, but we knew that they would find us eventually. So I spent long hours in the laboratory, and Jennings directed the movement at night, when one or more of its leaders reported for instruction and information.

Jennings gave them assurance that I didn't share. I was not

sanguine about my ability to make a shield against the turban guns of the Saints. But Jennings told them I would deliver, and pointed all effort toward Festival day, when the psychological effect of an exposé would be at a maximum.

They brought reports of new converts, and all wanted to be in at the kill.

Thompson, his one eye gleaming murderously, voiced their sentiments: "Let me get one of their throats in my hands is all I ask. That's all. I could die happy, then."

I was present when he said that. I asked about it, was told that the unbelievers wanted to kill the Saints.

"Then I'm through," I told Jennings and Thompson. "I'll not stand for killing them."

Thompson glinted at me, struck a match for his pipe on Methuselah's back. "Thought you didn't like us bein' slaves, Hanson."

"I don't."

"Funny way to talk, then."

"The Saints are honest in their error, Thompson. They honestly think they're divine. Anybody would. If all of us thought you, for instance, were a genius and convinced others, you'd be convinced before long. You'd be a superman, as I was, simply because belief made you so. Your honesty would be no less simply because you were mistaken. I say they don't die."

"What do you figure to do, put 'em in cages?"

"No. Show them their error, and let them help set up some form of democratic government. Who else has enough training to do the job. Monitors? They're slaves, like the rest of you."

"Saints won't help," Thompson insisted. "They like to grind us down too much. They like the best of everything, from women on down, and not workin' for it."

"Make your choice," I said.

"Do it my way, or do it without me."

"Can you do Hanson's job?" Thompson asked Jennings.

"No," Jennings said. "Nobody can but Bob."

"Then I reckon we got to," Thompson said regretfully. "The rest won't like this. I don't. Too much chance. Kill 'em, they won't bother any more. They been free enough killin' us. Try not salutin' one, see what happens."

"Make your choice."

"Got no choice," he said. "When do you figure to be ready?"

I realized how tired I was. "I don't know, I don't know. Everything jumbles together in my head. I've made so many diagrams, tried so many circuits, I don't know where I am."

"But the Festival's only a week off," Thompson said.

Jennings gave me a keen look, and Magda shook her head at Thompson. He got to his feet, and Jennings walked to the entrance with him.

"I wondered," Magda said, "how long you'd last."

"What do you mean? I'm all right. I'm just tired."

She smiled at me. "Sure, sure. Just wait, though, till you see your surprise."

She wouldn't tell me what, but she showed me the next night. She pushed Ellen ahead of her into the laboratory.

"I'll lock the door after I'm out," Magda said. "If you want out, beat on it."

She disappeared, and the latch clicked. Ellen stood with her back against the wall, bewilderment widening her gold-flecked eyes in which no recognition gleamed.

"What . . . what do you want?" she whispered. "Who are you?"

"Don't you know me, Ellen?"

"No. No."

"I'm Robert Hanson."

She tried to shrink through the wall. Her lips parted to let in a rasping breath. She flung

out one clawed hand, tensed the other against her pale throat. She said nothing. She stared.

You can take an emotional blow. It won't kill you. But sometimes you wish it would.

"What's the matter?" I growled at the open-mouthed girl. "I'm not going to harm you, you little fool."

She whirled and beat her fists against the door. "Let me out, let me out, let me—"

Magda yanked it open, pushed Ellen aside as she entered with Jennings.

"What the—" Magda began, eyeing us both. She broke off, frowned at Ellen. "What's eating you?"

"Let me go!" Ellen said passionately. "You wicked people! I didn't want to come when the man wouldn't tell me why or where. Oh, you'll be punished for this, terribly!"

"For what?" Magda demanded. "You're not hurt."

"For harboring that"—she leveled a finger at me—"that thing!"

Thing? Yes, I thought, that's what I was to the ordinary person. This is what the Saints had accomplished. Blind, unwavering fanatics, conditioned for years and years to believe in fear and hysteria.

You can be sick with emotion, too. But you don't die. It just seems that way.

"Go away," I said. "Leave me alone."

"Let me go," Ellen cried again. "Let me go!"

Magda looked at me. "I'm sorry, Bob." She turned on Ellen. "Sometimes I am appalled. I'm not going to like having you in my hair. But I don't guess you're worth killing."

"You're not going to . . . keep . . . me . . . here?" Ellen faltered.

"Not from choice, my pretty. Necessity."

"Go away," I said again. "All of you."

My tone turned their eyes on me. "I'm sorry," Magda said

again. "I thought she'd be what you needed to snap you out of your slump."

"Please . . . go . . . away!"

They went, and I looked at the floor for a long time. I had no particular thoughts. I felt even worse than I had before the High Council.

I told myself over and over: she's not worth this, she's not worth this.

I said to myself: "Are you a child who's lost its candy? You wanted to be a man. Well, be one."

I went back to work.

Sometime later Magda came in. She touched my arm.

"Go to bed, Bob. It's daylight."

"Leave me alone, Magda."

"Bob, you look awful. You'll kill yourself. Please get some rest."

I sealed the small neutronium box. "It's finished."

"Really? Will it work?"

"Certainly!" I barked. "Where is Methuselah?"

She grinned at me. "Ellen was what you needed, after all."

We placed the box on Methuselah's broad back. Jennings brought the turban gun.

"Wait!" Magda cried. "Are you certain it'll work, Bob?"

"No," I said. "I think maybe, though."

She got a leaf of lettuce for Methuselah. "Here, fella. If you die, you'll be happy. He loves it," she said to me, "if it has a touch of salt."

Jennings added his farewells. He patted the patterned shell. "So long, mascot."

I hadn't seen much of the ugly and somehow awesome creature. I'd been busy. But the Jenningses had made a friend of him.

I touched the button of the little box, and joined in the exclamations. For Methuselah had an aura, bright and blue like a Saint's.

"There's a bona fide Patriarch," Jennings said.

"He certainly looks legal," Magda added.

"It didn't have that effect on me in the lab," I said. "Pick it up, Magda, before he fires the turban gun."

She did, and had an aura. Methuselah's winked out the instant she took it in her own hand, as did hers when she replaced it.

Magda shivered. "I don't like to look like a Saint in any respect."

"Well," I said, "let's test."

Jennings aimed the gun, pressed the activator. Methuselah continued to chew the lettuce leaf with an appearance of ancient philosophical calm.

Jennings lowered the gun. "It works on him. But how about me?"

Magda caught a breath. "Don't be a fool. Try it on me."

"Why you?"

"One syllable words, pet. It must work on a human being, or we're in the soup. If it doesn't work, we'll be rooted out of here by guards before long. We'll be put to death. At least you will. Me, I may be chosen by Evan Wakefield. I'd rather be dead. Besides, you're the brains of this movement. Why risk your life when mine isn't worth much? If that gadget doesn't protect me, maybe it'll make you mad enough to build something that'll work."

Jennings looked at me and spoke quietly. "Will you go into the laboratory, Bob? If I've got to do this, I'd rather we were alone."

V.

The scream knifed through the laboratory door, high, shrill, and with almost the smell of horror. I was at the door before it cut off, short, and plunged into the central chamber.

Poor Jennings, I thought as I ran.

But he was kneeling beside Ellen, sprawled on the rock floor. Magda stood beside him,

the generator in her hand, glowing with the sacred blue nimbus. She looked up.

"There's nothing quite like a fainting woman to spoil a tender farewell," she said.

"She's all right," Jennings reported. "Shock, I guess, at Magda's looking like a Saint."

I looked down at Ellen, and didn't feel much of anything. Oh, she was still beautiful, but—

"Did it work?" I asked.

Magda glanced at the generator. "We haven't tried it. I was standing there, a tense and dramatic picture of lovely sacrifice. Both of us in tears as he aimed the gun with sweating hands. Then this blonde split the welkin. Well, let's get it over with." She thought a minute. "I hate anticlimax."

Jennings turned away from Ellen, aimed the turban gun at Magda. "All that emotion," he muttered, and fired.

He lowered the gun, grinned at me. "Well, let's have some breakfast."

Magda caught a deep breath. "Didn't hurt a bit. Good-by, Saints," she said, throwing a look in the direction of Eden.

Maybe they felt the same as I. I don't know. I thought so. I thought their veins must have hummed with exultation, their hearts must have pounded. The Saints could be conquered. The generator nullified the effect of an L ray. They must have felt it. It was their idea.

I looked at them. "What is there to eat?"

"Most anything," Magda said. "Let's get the sleeping beauty conscious."

We tried, but Ellen did not respond to treatment. She remained limp and apparently comatose. But she was alive—pulse, respiration normal, a faint flush on her pale golden skin.

We laid her on a couch and went out to the kitchen.

Halfway through our meal, footsteps pounded along the tunnel floor.

"What the hell!" Jennings said. "Surely they know better than to come here in broad daylight, the fools."

But the men who burst in on us were not members of the underground. They were monitors, four of them. Ellen pressed behind them.

"You will come along!" the leader snapped. "It is the command of the Saints."

Ellen pushed through and glared at us with fanatical fury. "Blasphemers!" she spat. "Now you will be justly punished."

Jennings took the turban gun from one of his pockets. "How did you boys get here?" he inquired pleasantly.

"The woman waved at us from the ground," said the leader. "She will be rewarded."

"We are stupid," Magda said, "leaving her alone. Well, we were pretty excited."

"I'll make you a proposition," Jennings said to the men. "You can help us, or you can die."

"There are only two of you," the leader said with contempt. "We are four."

"But I have this." Jennings displayed the gun. "Each Saint carries one in his turban. It isn't divine wrath that kills men. It's one of these." He smiled a little. "Divine wrath is a stream of terrene and contra-terrene electrons sprayed from a neutronium tube. Well? Don't stand there with your chins hanging down."

"I can't understand," the leader said, "why you don't drop dead. Blasphemer! The woman is right."

"The reason why I don't drop dead is simple," Jennings said. "I'm going to repeat what I have said to you, but I'm going to repeat it to the Patriarch while the whole world watches. I won't drop dead then, either. Let me tell you the reason. Stay where you are!"

He roared this last as they moved toward him, and the thundering tones stopped them. I

thought again: Jennings is a man to be obeyed.

"Listen," he said. "Long ago in an age of unrecorded events, men worshiped light. Sun worshipers, fire worshipers, and so on. Anything with radiance. We call that ignorance, superstition. Yet we have done it for three hundred years, paid homage to ordinary men who were born with an aura. Homage, hell! In every city of the world, the most trivial act is performed according to rules enforced by one of these little ray guns. It's time that light worship comes to an end, and we mean to end it. Listen."

He told them what we had accomplished, what we knew, and what we intended to do.

"You realize, of course," he concluded, "that you can't leave here alive with that knowledge, unless you help us. We have only a few days left. We can't let our plans be known."

It is doubtful if they heard him. It was like telling an astronomer that the world is flat. He knows, and he doesn't hear you. Oh, he apparently listens, but his mind is elsewhere. They were like that, the monitors. They stood quietly, but they probably didn't hear him saying that Saints were mortal. They knew.

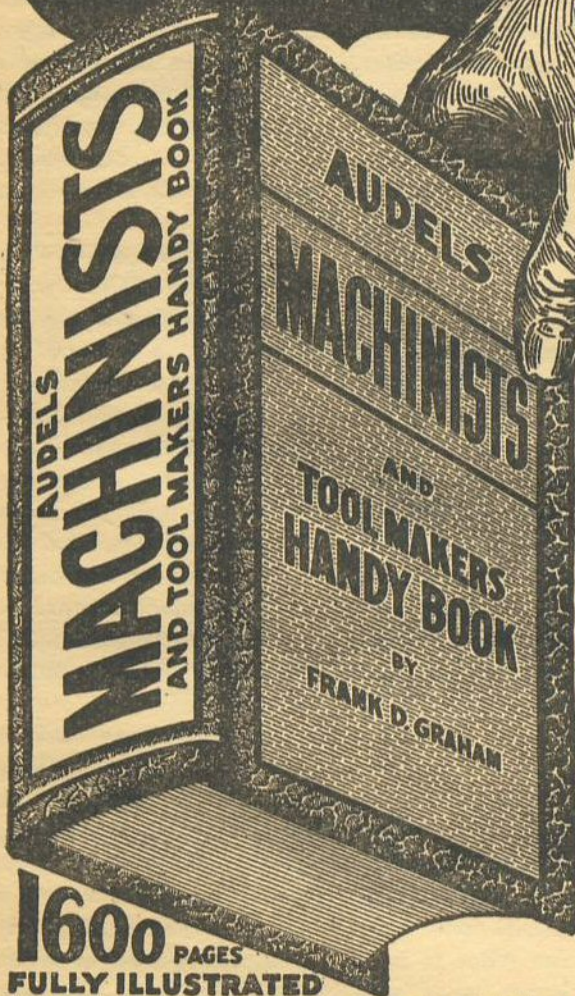
"Now we shall go," the leader said. "Come."

"Believe me," Jennings said, "I'm sorry. Stand aside, Ellen."

She was obedient, and her eyes had a queer expression. They were thoughtful, and her hands were no longer clenched. She stood to one side, watchful but not alert. She looked as though she kept her attention vaguely on matters at hand but that her mind was preoccupied. She looked soft again, and the remembered wave of tenderness rose in me again.

The monitors suddenly leaped at Jennings, and one veered off at me. He was somewhat larger than I, and strong with rigid

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training which I as a Saint had never had. He'd had some sleep, too, no doubt.

Anyway, I went down before his rush, and he kicked me in the side before he jumped in my face. I twisted away, swept his feet from under him, and he got my throat in his hands. I tore at them, but he was strong.

Suddenly, a sharp crack sounded, and a shattering tinkle. He fell away from me. I rolled free, got to my feet as he raised himself to one knee, and Jennings finished him.

Ellen stood over him with the neck of a water bottle in her hand and a look of wonder on her face.

"I . . . I hit a man," she said softly. "I hit a *man*!"

"And well done," Jennings said heartily. "I was afraid to fire, Bob, for fear of getting you, too."

"Why?" I snarled. "I'm immune. You know that."

"Damn!" he exclaimed. "I forgot."

"So you let me be nearly killed."

"I'm sorry, Bob. All I thought about was that you had yet to make another modulator."

"I've already made it. I had to, to get anywhere on a generator."

Jennings grinned. "If I'd known that, of course, I'd have drilled you."

Ellen looked from one to another of the bodies, then at me. "I . . . I was afraid he was going to . . . to kill you. I'm so ashamed. But I couldn't help myself."

Both Jennings and Magda narrowed thoughtful eyes at her. "What's this?" Jennings asked. "Have we made a convert?"

"Take it easy," Magda counseled. "She went outside and hailed them."

"But I had to!" Ellen cried. "To see a *woman* with an aura—I thought I'd go mad. But now, after hearing the whole story—"

"You're convinced I was right?" I asked.

"I don't know, I don't know," she said wearily. "It's all so confusing. All I know is that I was terribly afraid they were going to harm your Rev . . . to hurt you."

I stifled the emotion that rose in me, for I remembered what Jennings had told me. The Saints must never have children. This girl could find a normal life with somebody, but not with me. She could become a mother—with somebody else. There were many things I could do toward building the new world we were going to attempt to found. But I couldn't become a father.

So I merely said, "Thank you, Ellen."

She got it. She looked at me for a moment, then an expression of pain flickered across her eyes before she dropped them.

"Let's get going!" Jennings broke in. "That plane is out there. Each of you get into one of those uniforms. We can't stay here."

"Where can we go?" I asked. "We still have five days. Where can we hide, besides here?"

"We're going to risk a call," Jennings said grimly. "We can't do this job alone. As you say, Bob, we have five days. With plenty of help, how many generators could you make?"

"Maybe a hundred. Why?"

"We've got to get out of here. We'll go to Thompson's."

I didn't like this. "And somebody will notice that Thompson has company, and mention it to his monitor, who will come rooting around to see what is happening. You know what will happen then."

"Oh, didn't I tell you, Bob?" Jennings grinned. "You see, Thompson *is* a monitor."

Four persons, with laboratory equipment and a huge desert ter-rapin, crowded a patrol plane. But we managed it, and managed to hide high in the air until night began to mask the face of the desert twenty thousand feet below.

We didn't speak. We kept an eye out for other planes and watched a purple cloak slip across the earth pocked with desert hills. Watched the sun linger, then drop regretfully out of sight.

"Well," Jennings said when it was dark, "here goes."

"God help us," Magda replied, "if a Saint intercepts this. Wakefield would come slaving for Ellen."

Ellen slipped a trembling hand into mine. I pressed it perfunctorily, my attention on the blond giant at the controls.

He sat in the pilot's seat, his feet on Methuselah's shell, and began to warm up the transmitter. As he reached for the power switch, he drew back suddenly.

"What am I doing?" he asked in disgust. "Can you women rig me up something that looks like a Saint's turban?"

With much twisting around, tearing of cloth, and all the other activities that go into making a costume, Magda and Ellen presently contrived a reasonable facsimile of a turban. Jennings tried it on, eyed himself in a small, lighted mirror.

"My, I'm handsome," he commented. "Where's that damned generator?"

The plane was dark, save for Jennings' aura. When he pressed the generator button, I heard a strange, soft gurgle from Ellen. In the faint illumination of the aura I saw that she had not, as I expected, flung up an involuntary arm at sight of the aura. Instead, the sound she made was suspiciously like a giggle.

"Thompson, monitor," Jennings called into the screen. Over and over: "Thompson, monitor."

Several faces appeared in succession on the screen, not in answer, but out of curiosity. They were strangers, monitors perhaps, but they cut out at sight of Jennings' aura—after the appropriate salute. And one

was Gerald Holmes, a quiet old Saint who was a trifle feeble-minded. He peered at Jennings, nodded, and cut out.

Then Thompson appeared. His one eye widened as he recognized Jennings, and he made a sardonic salute.

"We are coming," Jennings said, and broke the circuit.

We swooped toward a little town at the edge of the desert, several hours from Eden, which was a faint glow against the far sky. With Jennings leading the way through the dark streets, we marched without mishap to the home headquarters of the one-eyed monitor.

Our progress was slow, because Magda insisted on bringing Methuselah with us. Jennings and I carried him by turns, and in turn sought Magda's permission to discard the sixty-pound carapaced reptile.

"But he's our mascot," she protested, as she had protested at the cave when we wanted to leave him behind.

Thompson had a cellar, and means of sending out the word that we were there. I had the equipment set up, and soon men began to arrive.

Of the next five days, I know very little. In some way, Thompson and his men contrived to hide the patrol plane, which we had left in a field, for we used it on the fourth day.

In the meantime, though, we turned out generators. We slept practically not at all; we ate between fusing connections in the generators.

As soon as one was finished, it was taken away. I did not know at the time, or care, where they went. Those outside my makeshift laboratory were familiar with the whole movement, and knew what to do. Although I was involved in

this to the extent that my life was forfeit if we failed, I trusted Jennings. He knew what he was about.

Came the night, then, when Jennings came into the lab and halted the work. He sent my helpers away, and looked steadily at me. He was dressed in a replica of a Saint's costume, but he had no aura.

"This is it, Bob," he said quietly. "The Festival's tomorrow. Come on. We'll want to be present."

"What do you intend to do? What's the program?"

"We've worked it out in detail, and it's too complicated to explain in a moment. We're a trifle pressed for time."

I went with him. He knew what was at stake. If he was satisfied with the plan, I had no questions.

I hadn't known, but it was early evening when we—Magda, Ellen, Jennings, and I—marched through the streets again. In that basement laboratory, I had lost all sense of time. As we marched, I was not cognizant of our surroundings, or any activity therein. I saw that Jen-

nings' giant frame was enhaloed in the sacred blue, and that occasional pedestrians saluted the party, but my head was still full of tiny wires, diagrams, and circuits.

We reached the plane, and boldly slipped into the air. We were safe, because the attention of the world was not on the disappearance of a patrol plane, which was not unprecedented. Nor was it on our probable whereabouts.

It was on the Festival. We turned on the screen and watched elimination contests in London, Vienna, New York, Honolulu, Rio de Janeiro, and others of the five hundred key cities from which the winners would be sent to Eden on the morrow for the Saints to take as mothers of the next generation of rulers.

Elimination contests they really were, but so masked with ritualistic ceremony and formality that they were impressive pageantry. The district chief monitor presided unless a Saint could be persuaded to officiate in the measurement and questioning of candidates. These came in all sizes, colors, and degree

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of intelligence; but they had one characteristic in common—they believed.

"As I did," Ellen remarked, commenting on the protestations of a fiery little Roman girl.

We watched the small screen for a few moments until Magda cut it off.

"You don't now?" she asked.

Ellen considered. "I must be honest—with myself more than with you. Intellectually, I suppose, I don't believe. I think it's amusing. But there are several generations of belief behind me. I can say I think the Saints are merely men, but I have an uneasy fear that I'll be struck dead for it."

Magda looked at me. "I thought you had picked a dud, Bob, a few days ago. I apologize."

Ellen had a sort of glow in her eyes as she looked at me, and the hardest thing I ever did was to turn to Jennings and say casually, "What's up?"

"We're headed for Eden, my boy, whose flaming swords we no longer fear."

Presently we were in a field on the outskirts of the outer city. We sat quietly for a few moments, listening to the gentle rain which the weather station had sent to these acres of cabbages. Ten miles ahead, the shining towers of the inner city thrust toward the stars.

"Bob and I will set the stage," Jennings said to Magda. "You know what to do."

"If you need a quick getaway, I'll be there."

"Good-by—Robert," Ellen breathed.

I smiled, nodded. I wanted to kiss her, but I didn't. I followed Jennings.

We started toward the city, and the plane slipped silently off in the darkness. Jennings and I were apparently a Saint and a monitor on nobody's business but our own.

The generator was strapped to Jennings' skin, under the robe, and his blue radiance was indistinguishable from the real thing. As we entered a street, he took the L-ray gun from some pocket and handed it to me.

"If anybody gets suspicious, drop 'em," he whispered. "I don't think they will, but we can't take a chance now."

"Where are we going?"

"To your old apartment. That's the safest place in town. We've had it under surveillance, and nobody has showed any interest in it." He chuckled. "I'll give you the plan later. You'll love it."

I trailed him a few feet, with the ray gun ready under my cloak. I forced myself not to think of Ellen.

My alertness was unnecessary. Such few citizens as we met covered their eyes, and two women bent the knee to Jennings. He made no recognition of their obeisance, and led the way into the inner city as a Saint should.

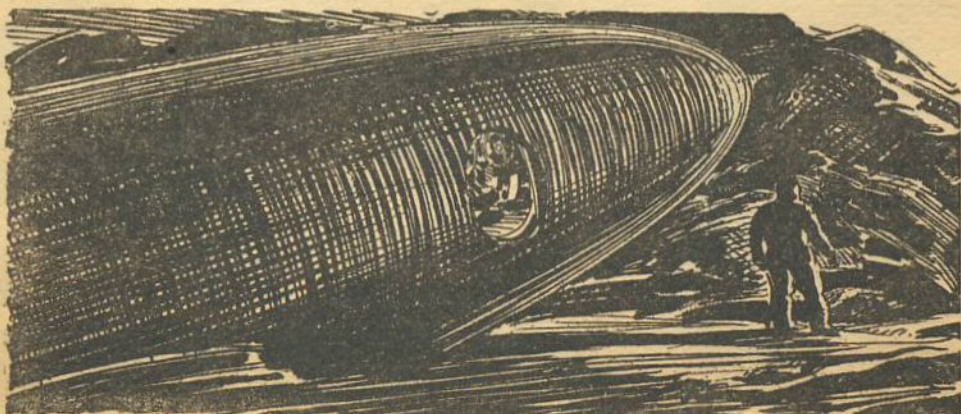
VI.

When you have been a certain person all your life and suddenly, while you are still young, learn that you are in reality someone else, adjustment does not come as quickly as realization. You have formed deep patterns of conduct, thinking, emotion and belief. The inevitable re-formation of these patterns comes slowly, even though the knowledge of your former pseudonymity is stronger than your faith itself.

For this reason, I felt that we were committing a sacrilege when Jennings and I strode down the aisle of the auditorium toward the Patriarch and the giant screen. I hadn't been affected as we moved between, through, and around the crowds which packed the inner city on Festival day; nor when we marched up the steps down which I had so recently plunged with despairing hopes of survival in my heavy heart. But I was uneasy when we entered the auditorium.

Few eyes in that packed and glowing audience noted us at first, for Jennings was apparently a Saint arriving late. I was perhaps unnoticed, or mentally explained as a part of the ceremony to come. All eyes, all ears, heeded the Patriarch's preliminary formalities.

"—are met here," he was saying in that stirring voice, "to commemorate a most solemn occasion. For today we choose



the mothers of the next generation of Saints to replace those among us who will ascend to their reward in the coming months. Those mothers will be the flower of womanhood, selected with care and rigidity. They—" He broke off as he caught sight of us.

A series of crowd images continued to flash on the giant screen behind the Patriarch as we marched toward the stage in the expectant silence which dropped over the audience. The Patriarch looked at us calmly and without recognition.

"Brother," he said to Jennings, and a scanner swiveled to include us in the image which went out to the world, "you are late. You are—" He paused, frowned. "Who are you? I do not recognize you."

Jennings was respectful, though unabashed. "I am Jennings, your Reverence. My companion is Robert Hanson. I should like to say a few words."

Movement in the audience caught my eye. Wakefield. He shot to his feet, touched the button on his robe as he looked at us. An expression of puzzlement knitted his brows when we did not fall dead.

"Kill them, you fools!" he said. "Kill them!"

Several Saints, then more, stood and directed their turban guns at us. Jennings turned, and with impressive dignity waved them back into their seats.

"We're immune," he said, "to your toys. Hanson because he is a Saint. I because he is a genius."

Wakefield refused to take this. He hurried into the aisle and rushed toward us.

"Blasphemer!" he snarled. "Hanson is no Saint, nor you. You may be immune to our wrath, but not to these!"

He flung himself at Jennings, glowing hands clawing toward Jennings' glowing throat. They locked in battle.

Jennings was large, but so was

Wakefield. We all looked on, shocked to silence by this physical combat.

They wrenched at each other, hit at each other, kicked each other. They struggled back and forth in front of the stage, snarling. Wakefield driven by his fury, by certainty, I suppose, that if he did not destroy us, we should destroy all Saints. Jennings had a greater drive—Magda. Here was the man who was going to take her from him.

All the while, scanners translated the scene to images on screens all over the world. The effect on various crowds was shown on the big screen across which were to parade the candidates later.

"Stop!" the Patriarch finally cried. "This is a sacred place!"

He cried too late, for Jennings suddenly picked Wakefield up in his desert-hardened hands, lifted him high, and flung him head-down to the floor.

A sharp crack! Wakefield's aura faded, died. He lay still. Jennings looked grimly at the Patriarch.

"If I'm not mistaken," he said, "I've just ascended a Saint." He looked at the scanners, the screen. "He died as any of us!" he shouted. "That's because he's a man, and I can prove it!" He lowered his voice. "May I say a few words, your Reverence?"

Furor.

The Saints leaped up, cried out in fury, plunged down the aisle. We faced them. The Patriarch's voice roared.

"Silence! Would you foul your own temple?"

This shocked them, checked the stampede. They returned to their seats, but not sheepishly, as their action warranted. They were sullen, and somewhat uneasy.

The Patriarch looked down on us, a tremendous dignity on his lined face. "This," he said, "is unforgivable. Before I strike you down, you may have a word.

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Explain your execrable acts, if you can."

I broke in. "May I explain, your Reverence, to the world?"

I felt sorry for him, for he was shaken. He didn't know how to address me, an excommunicated, scourged, and hunted former Saint. After a few seconds of silent indecision, he nodded wearily and seated himself on the Throne. I mounted the stage and spoke into a scanner. Behind me, the wide-eyed crowds replaced each other on the great reception screen.

"I am Robert Hanson," I said. "I had two names. I was a Saint. But listen to me."

I told them what we had discovered, what we had done. Now and then I shot a glance at the big screen, the mixture of expressions on the faces. Some were horrified, some thoughtful, some angry. This latter group increased in number as I told them of the hoax.

"But the Saints have been honest," I insisted. "Most of us really believed in our divine origin. We have not harmed you, we have merely enslaved you. But that slavery is not as irksome nor as rigid as the military slavery which shackled men for centuries before the first boy child was born with an aura. We propose that the Saints remain in nominal authority until governments are established, but that their auras be removed, and—"

"Stop!" cried the Patriarch in a quavering voice. "I shall not allow this blasphemy. If, by

some devilish chance, you have contrived to make yourself immune to our wrath—"

I pulled the turban gun from under my cloak and waved it before the scanner. "This is Saintry wrath," I said. "Each of us wore one in his turban. We pressed a button to kill and called it wrath. Each of these weapons is a miniature duplicate of that greater weapon which brought us into being."

"Stop!" the Patriarch cried again. I turned to him.

"I have revered you, your Reverence. I believed, and still believe, that you are honest. But that first Patriarch was not honest. He knew we could die, knew that science killed for us, knew that 'ascension' was a lie."

"Please!" begged the Patriarch. "You have made statements for which you should be put to death." He faced the scanner. "We have ruled as wisely and as well as we could according to the Codex. This . . . this—Robert Hanson has made serious charges, so serious that they must be disproved here and now. You say"—he roared at me in mighty wrath—"that we are men, that our divine aura is false, caused by certain disturbances of our ancestors' germ plasm. Prove it!"

I took the modulator from my cloak and pointed it at him. I turned the rheostat, and his aura winked out as mine had.

A hush fell, and I was sorry. The old man was trembling. All he had ever known was destroyed. I knew that he felt that sensation of nakedness, for

he shrank away from the scanner for a second. Then he squared his shoulders.

"Listen to me," he cried. "All men everywhere, listen!"

The faces on the screen were intent, with now and then a face whose eyes were narrowed in anger. The angry were not as numerous as when I had spoken, but crowds in various parts of the world were liberally sprinkled with them.

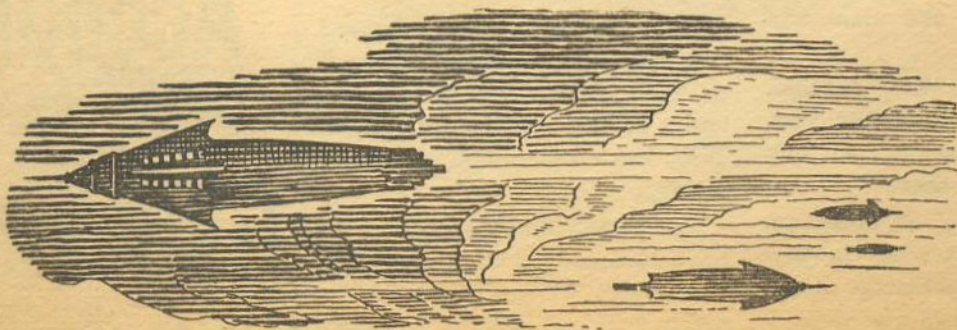
The Patriarch, however, got no further. A commotion in the audience as several Saints leaped to their feet drew his attention, and scanners swung to cover this new development.

"Wait!" one cried. "This proves nothing. They have removed your aura, your Reverence, may God forgive them. But is this proof that the aura is not God-given? It is not! A man may cut down a tree, and kill it. Does that prove that the tree is man-made?"

A mutter of approval rippled the massed Saints, and their expressions began to change. Whereas they had been shocked, frightened, and bewildered, they now smiled with smug tolerance.

Jennings faced them. "The analogy is not valid," he said. He told them again of the small area from which all Saints had stemmed. "Is that not evidence?" he cried. "But wait! We have further proof. Come in!" he cried into the screen.

A hush fell. All eyes swiveled toward the great double doors which swung slowly open



to admit a group of men. Men. Just ordinary men, but by the expression in their eyes, I knew these to be the underground. They sneered.

They marched down the aisle, and scanners threw their images to the world. Watchers on the big screen now had no expression save that of intent interest.

Jennings halted the men, spoke to the Saints.

"Here we have about one hundred of your slaves who have dared to question your right to rule. They enter here, knowing that they may be killed, but willing to die to show the world that Saints are merely men. Watch!"

He waved his hand, and the men packed in the wide aisle glowed with the sacred radiance. Each pressed his hidden generator at the same instant, and the effect was startling.

I watched the big screen, for in those faces we would read success or failure. After all, they were the people we had to convince.

And now I saw anger. Men began to shout, and women—women!—to mouth insults. They saw now, in one dramatic instant, the generations of slavery to an accidental mutation. Here was proof. The crowds began to mill around, and many men slipped out of view with grim faces, intent on going somewhere.

But the quartet of Saints refused even this evidence.

"These are Saints!" yelled the spokesman above the hubbub. "Jennings has some way to blanket their aura. They are Saints which he has kept hidden. They are not men!"

This, too, found favor. The Saints were grasping at anything.

Then a Saint yelled, "Kill them! They have no protection against our hands!"

Jennings made another instant gesture. He motioned the men to the stage, and they poured onto it. We stood there, a hundred against five-to-one odds.

"If you want a fight," Jennings boomed, "we are ready. We have told you the truth. Look at the people. They believe."

This was true. Belief was written on each changing screenful of faces all over the world.

But the Saints, now proving themselves men in the fury of defeat, began to move into the aisle and advance toward the stage.

"Wait!" commanded the Patriarch, but they ignored him.

We set ourselves. We were ready.

They walked slowly, hands clawed at their sides. A few pressed their ray guns to life, but desisted when none of us fell.

The scanners followed every move.

Then a scream rang out from the rear. A woman's scream. Heads turned. A gasp went up. A path widened in the aisle. Scanners shifted.

There was Magda—and Methuselah.

She led him down the aisle with a ribbon around his ancient neck. On his carapace was strapped a generator, and he glowed, as did she, with a blue aura.

The hall was thick with utter silence.

"God given?" Jennings asked sarcastically. "You know that women do not glow, for reasons which we have explained. But say that she is a man in disguise, which she isn't, that leaves Methuselah. Look at him, gentlemen! Saint Methuselah!"

They looked. There is an austere dignity about a terrapin, in the deliberate way in which he makes one slow step after another. They may be stupid, too, but like owls they have the wisdom of ages written in their puckered faces. No dignitary ever moved with the sure courage of Methuselah.

The aura helped, of course. It gave him authority, and character.

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A sound broke the silence. A strange sound which focused all eyes on the Patriarch. A sound all but forgotten by adults, silenced by centuries of superstition.

He laughed.

It started as a low, bubbling chuckle. Then this calm old man who personified all we knew of dignity and kindness, tipped back his ancient head and vented a lusty guffaw which made him so lovably human that my eyes smarted.

On the big screen, one group of startled faces followed another as the Patriarch loosed peal after peal of joy. He became weak with it, and groped toward the Throne, where he sat with streaming eyes.

Then, on the screen, one man picked it up. He smiled, chuckled, and then howled with amusement.

It spread. It was infectious. It spread across the world. Men laughed, women giggled, and small children, not knowing why, cavorted with glee.

Presently, this healing emotion communicated itself to the hall as Magda and Methuselah continued their stately march down the aisle. A few Saints smiled, then others.

But, aside from one here and there, the Saints did not laugh. They were amused, but they lacked the unself-consciousness of the Patriarch. They merely smiled.

We—the cabal—waited. Presently the Patriarch came to the transmitting screen again.

"This is proof," he said pleasantly. "Are we agreed, here? Let's have a show of hands."

You could hardly blame them for their reluctance. Here was destruction. For generations, Saints had ruled, and in a few

moments the right to rule had been destroyed by a few men, a woman, and a desert terrapin.

But they agreed, finally. They wanted to know where they would fit into the new order first, but agreed after Jennings explained.

I didn't hear all of that explanation. Jennings told them that the world must look to them as administrators, for they had been trained. They must start the ball rolling.

"And it has suddenly occurred to me," he said, "that you can take your places among men and lead ordinary lives in all respects. Your auras no longer have any psychological significance, and can be removed. But we are agreed, I assume, that future sons of yours should not be allowed to retain the auras with which they will be born?"

He waited for their approval.

"When we were first planning the coming steps," he went on, "we were agreed that no Saint should be allowed to marry and have children."

I swung and faced him intently.

"I was so wrapped up with the importance of the project," Jennings said, "that I didn't see the obvious solution. We can place a modulator in every hospital, and a baby's aura can be removed at birth. Neither he nor his mother will ever know that he bears Saint's blood. You will, therefore, not be set apart from other men, which would cause you some mental trouble. You—"

I heard no more. I slipped out a side door, around to the main steps, that same flight on which I thought I was going to die not long before.

Ellen was waiting there.

THE END.



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