

Robert A. Heinlein
The Classic Collection of Robert A. Heinlein. Short Stories: *Let There Be Light, Life-Line, Requiem, Misfit* and others

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—WE ALSO WALK DOGS

“GENERAL SERVICES—Miss Cormet speaking!” She addressed the view screen with just the right balance between warm, hospitable friendliness and impersonal efficiency. The screen flickered momentarily, then built up a stereo picture of a dowager, fat and fretful, overdressed and underexercised.

“Oh, my dear,” said the image, “I’m so upset. I wonder if you *can* help me.”

“I’m sure we can,” Miss Cormet purred as she quickly estimated the cost of the woman’s gown and jewels (if real—she made a mental reservation) and decided that here was a client that could be profitable. “Now tell me your trouble. Your name first, if you please.” She touched a button on the horseshoe desk which inclosed her, a button marked “Credit Department.”

“But it’s all so *involved*,” the image insisted. “Peter *would* go and break his hip.” Miss Cormet immediately pressed the button marked “Medical.”

“I’ve *told* him that polo is dangerous. You’ve no idea, my dear, how a mother suffers. And just at this time, too. It’s so inconvenient—”

“You wish us to attend him? Where is he now?”

“Attend him? Why, how silly! The Memorial Hospital will do that. We’ve endowed them enough, I’m sure. It’s my dinner party I’m worried about. The Principessa will be so annoyed.”

The answer light, from the credit department was blinking angrily. Miss Cormet headed her off. “Oh, I see. We’ll arrange it for you. Now, your name, please, and your address and present location.”

“But don’t you *know* my name?”

“One might guess,” Miss Cormet diplomatically evaded, “but General Services always respects the privacy of its clients.”

“Oh, yes; of course. How considerate. I am Mrs. Peter van Hogbein Johnson.” Miss Cormet controlled her reaction. No need to consult the credit department for this one. But it’s transparency flashed at once, rating AAA—unlimited. “But I don’t see what you can *do*,” Mrs. Johnson continued. “I can’t be two places at once.”

“General Services likes difficult assignments,” Miss Cormet assured her. “Now—if you will let me have the details—”

She wheedled and nudged the woman into giving a fairly coherent story. Her son, Peter III, a slightly shopworn Peter Pan, whose features were familiar to Grace Cormet through years of stereogravure, dressed in every conceivable costume affected by the richly idle in their pastimes, had been so thoughtless as to pick the afternoon before his mother’s most important social function to bung himself up—seriously. Furthermore, he had been so thoughtless as to do so half a continent away from his mater.

Miss Cormet gathered that Mrs. Johnson’s technique for keeping her son safely under thumb required that she rush to his bedside at once, and, incidentally, to select his nurses. But her dinner party that evening represented the culmination of months of careful maneuvering. What was she to *do*?

Miss Cormet reflected to herself that the prosperity of General Services and her own very substantial income was based largely on the stupidity, lack of resourcefulness, and laziness of persons like this silly parasite, as she explained that General Services would see that her party was a smooth, social success. A portable full-length stereo screen would be installed in Mrs. Johnson’s drawing room in order that she might greet her guests and make her explanations while hurrying to her son’s side. Miss Cormet would see that a most adept social manager was placed in charge, one whose own position in society was irreproachable and whose connection with General Services was known to no

one. With proper handling, the disaster could be turned into a social triumph, enhancing Mrs. Johnson's reputation both as a clever hostess and as a devoted mother.

"A sky car will be at your door in twenty minutes," she added as she cut in the circuit marked 'Transportation', "to take you to the rocket port. One of our young men will be with it to get additional details from you on the way to the port, A compartment for yourself and a berth for your maid will be reserved on the 10:45 rocket for Newark. You may rest easy now. General Services will do your worrying."

"Oh, thank you, my dear. You've been such a help. You've no idea of the *responsibilities* of a person in my position."

Miss Cormet clucked-clucked in professional sympathy while deciding that this particular old girl was good for still more fees. "You *do* look exhausted, madame," she said anxiously. "Should I not have a masseuse accompany you on the trip? Your health is delicate, is it not? Perhaps a physician would be still better."

"How thoughtful you are!"

"I'll send both," Miss Cormet decided, and switched off, with a faint regret that she had not suggested a specially chartered rocket. Special service, not listed in the master price schedule, was supplied on a cost-plus basis. In cases like this, "plus" meant all the traffic would bear.

She switched to "Executive"; an alert-eyed young man filled the screen. "Stand by for transcript, Steve," she said. "Special service, triple-A. I've started the immediate service."

His eyebrows lifted. "Triple-A—bonuses?"

"Undoubtedly. Give this old battleax the works—smoothly. And look—the client's son is laid up in a hospital. Check on his nurses. If anyone of them has even a shred of sex appeal, fire her out and put a zombie in."

"Gotcha, kid. Start the transcript."

She cleared her screen again; the "available-for-service" light in her booth turned automatically to green, then almost at once turned red again and a new figure built up in her screen.

NO STUPID WASTER, this. Grace Cormet saw a well-kempt man in his middle forties, flat waisted, shrewdeyed, hard but urbane. The cape of his formal morning clothes was, thrown back with careful casualness. "General Services," she said. "Miss Cormet speaking."

"Ah, Miss Cormet," he began, "I wish to see your chief."

"Chief of switchboard?"

"No, I wish to see the president of General Services."

"Will you tell me what it is you wish? Perhaps I can help you."

"Sorry, but I can't make explanations. I must see him at once."

"And General Services is sorry. Mr. Clare is a very busy man; it is impossible to see him without appointment and without explanation."

"Are you recording?"

"Certainly."

"Then please cease doing so." Above the console, in sight of the client, she switched off the recorder. Underneath the desk she switched it back on again. General Services was sometimes asked to perform illegal acts; its confidential employees took no chances. He fished something out from the folds of his chemise and held it out to her. The stereo effect made it appear as if he were reaching right out through the screen.

Trained features masked her surprise—it was the sigil of a planetary official, and the color of the badge was green.

“I will arrange it,” she said. “Very good. Can you meet me and conduct me in from the waiting room? In ten minutes?”

“I will be there, Mister—Mister—” But he had cut off.

Grace Cormet switched to the switchboard chief and called for relief. Then, with her board cut out of service, she removed the spool bearing the clandestine record of the interview, stared at it as if undecided, and after a moment dipped it into an opening in the top of the desk where a strong magnetic field wiped the unfixed patterns from the soft metal.

A girl entered the booth from the rear. She was blond, decorative, and looked slow and a little dull. She was neither. “O.K., Grace,” she said. “Anything to turn over?”

“No. Clear board.”

“’Smaller? Sick?”

“No.”

With no further explanation Grace left the booth, went on out past the other booths housing operators who handled unlisted services, and into the large hall where the hundreds of catalogue operators worked. These had no such complex equipment as the booth which Grace had quitted. One enormous volume, a copy of the current price list of all of General Service’s regular price-marked functions, and an ordinary look-and-listen enabled a catalogue operator to provide for the public almost anything the ordinary customer could wish for. If a call was beyond the scope of the catalogue, it was transferred to the aristocrats of resourcefulness, such as Grace.

She took a short cut through the master files room, walked flown an alleyway between dozens of chattering punched-card machines, and entered the foyer of that level. A pneumatic lift bounced her up to the level of the president’s office. The president’s receptionist did not stop her, nor, apparently, announce her. But Grace noted that the girl’s hands were busy at the keys of her voder.

SWITCHBOARD operators do not walk into the office of the president of a billion-credit corporation. But General Services was not organized like any other business on the planet. It was a *sui generis* business in which special training was merely a commodity to be listed, bought, and sold, but general resourcefulness and a ready wit were all important. In its hierarchy, Jay Clare, the president, came first; his handyman, Saunders Francis, stood second; and the couple of dozen operators, of which Grace was one, who took calls on the unlimited switchboard, came immediately after. They and the field operators who handled the most difficult unclassified commissions—one group, in fact, for the unlimited switchboard operators and the unlimited field operators swapped places indiscriminately.

After them came the tens of thousands of other employees spread over the planet, from the chief accountant, the head of the legal department, the chief clerk of the master files on down through the local managers, the catalogue operators to the last classified part-time employee—stenographers prepared to take dictation when and where ordered, “escorts” ready to fill an empty place at a dinner, the man who rented both armadillos and trained fleas.

Grace Cormet walked into Mr. Clare’s office. It was the only room in the building not cluttered up with electro-mechanical recording and communicating equipment. It contained nothing but his desk—bare—a couple of chairs, and a stereo screen which, when not in use, seemed to be Krantz’s

famous painting, "The Weeping Buddha." The original was in fact in the sub-basement, a thousand feet below.

"Hello, Grace," he greeted her, and shoved a piece of paper at her. "Tell me what you think of that. Sance says it's lousy." Saunders Francis turned his mild popeyes from his chief to Grace Cormet, but neither confirmed nor denied the statement:

Miss Cormet read:

**CAN YOU AFFORD IT?
Can You afford GENERAL SERVICES?
Can You afford NOT to have
GENERAL SERVICES?????**

In this jet-speed age, can you afford to go on wasting time doing your own shopping, paying bills yourself, taking care of your living compartment?

We'll spank the baby and feed the cat.

We'll rent you a house and buy your shoes.

"We'll write to your mother-in-law and add up your check stubs. No job too large; no job too small—and amazingly Cheap!

**GENERAL SERVICES
Dial H-U-R-R-Y—U-P
P.S. WE ALSO WALK DOGS**

"Well?" said Clare.

"Sance is right. It smells."

"Why?"

"Too logical. Too verbose. No drive."

"What's your idea of an ad to catch the marginal market?"

She thought a moment, then borrowed his stylus and wrote:

**DO YOU WANT SOMEBODY
MURDERED?
(Then DON'T call GENERAL SERVICES)
But for ANY other job, dial HURRY-UP
IT PAYS!**

P.S. We also walk dogs

"Hm-m-m—well, maybe," Mr. Clare said cautiously. "We'll try it. Sance, give this a Type B coverage, two weeks, North America, and let me know how it takes." Francis put it away in his kit, still with no change in his mild expression. "Now, as I was saying—"

"Chief," broke in Grace Cormet, "I made an appointment for you in"—she glanced at her watch finger—"exactly two minutes and forty seconds. Government man."

"Make him happy and send him away. I'm busy."

"Green badge."

He looked up sharply. Even Francis looked interested. "So?" Clare remarked. "Got the interview transcript with you?"

"I wiped it."

"You did? Well, perhaps you know best. I like your hunches. Bring him in."

She nodded thoughtfully and left.

GRACE CORMET found her man just entering the public reception room and escorted him past half a dozen gates whose guardians would otherwise have demanded his identity and the nature of his business. When he was seated in Clare's office he looked around. "May; I speak with you in private, Mr. Clare?"

“Mr. Francis is my right leg. You’ve already spoken to Miss Cormet.”

“Very well.” He produced the green sigil again and held it out. “No names are necessary just yet. I am sure of your discretion.”

The president of General Services sat up impatiently. “Let’s get down to business. You are Pierre Beaumont, chief of Protocol. Does the administration want a job done?”

Beaumont was unperturbed by the change in pace, “It seems you know me. Very well. We’ll get down to business. The government may want a job done. In any case, our discussion must not be permitted to leak out—”

“All of General Services relations are confidential.”

“This is not confidential; this is secret.” He paused.

“I understand you,” agreed Clare. “Go on.”

“You have an interesting organization here, Mr. Clare. I believe it is your boast that you will undertake any commission whatsoever—for a price.”

“If it is legal.”

“Ah, yes; of course. But legal is a word capable of interpretation. I admired the way your company handled the outfitting of the Second Plutonian Expedition. Some of your methods were—ah—ingenious.”

“If you have any criticism of our actions, in that case they are best made to our legal department through the usual channels.”

Beaumont pushed a palm in his direction. “Oh, no, Mr. Clare—please! You misunderstand me. I was not criticizing; I was admiring. Such resource! What a diplomat you would have made!”

“Let’s quit fencing. What do you want?”

Mr. Beaumont pursed his lips. “Let us suppose that you had to entertain a dozen representatives of each intelligent race in this planetary system and you wanted to make each one of them completely comfortable and happy. Could you do it?” Clare thought aloud. “Air pressure, humidity, radiation densities, atmosphere chemistry, temperatures, cultural conditions—those things are all simple. But how about acceleration? We could use a centrifuge for the Jovians, but Martians and Titans and Callistans and the rest of the small-planet people—that’s another matter. There is no way to reduce Earth-normal gravity. No, you would have to entertain them out in space, or on Luna. That makes it not our pigeon; we never give service beyond the stratosphere.”

Beaumont shook his head. “It won’t be beyond the stratosphere. You may take it as an absolute condition that you are to accomplish your results on the surface of the Earth.”

“Why?”

“Is it the custom of General Services to inquire why a client wants a particular type of service?”

“No. Sorry.”

“**Q**UITE all right. But you do need more information in order to understand what must be accomplished and why it must be secret. There will be a conference, held on this planet, in the near future—ninety days at the outside. Until the conference is called, no suspicion that it is to be held must be allowed to leak out. If the plans for it were to be anticipated in certain quarters, it would be useless to hold the conference at all. I suggest that you think of this conference as a round table of leading—ah—scientists of the System, about of the same size and make-up as the session of the academy held on Mars last spring. You are to make all preparations for the entertainment of the delegates, but you are to conceal these preparations in the ramifications of your organization until needed. As for the details of—”

But Clare interrupted him. "You appear to have assumed that we will take on this commission. As you have explained it, it would involve us in a ridiculous failure. General Services does not like failures. You know and I know that low-gravity people cannot spend more than a few hours in high gravity without seriously endangering their health. Interplanetary get-togethers are always held on a low-gravity planet and always will be."

"Yes," answered Beaumont patiently, "they always have been. Do you realize the tremendous diplomatic handicap which Earth and Venus labors under in consequence?"

"I don't get it."

"It isn't necessary that you should. Political psychology is not your concern, Take it for granted that it does and that the administration is determined that *this* conference shall take place on Earth."

"Why not Luna?"

Beaumont shook his head. "Not the same thing at all. Even though we administer it, Pied-a-Terre is a treaty port. Not the same thing, psychologically."

Clare shook his head. "Mr. Beaumont, I don't believe that you understand the nature of General Services, even as I fail to appreciate the subtle requirements of diplomacy. We don't work miracles and we don't promise to. We are just the handymen of the last century, gone speed-lined and corporate. We are the latter-day equivalent of the old servant class, but we are not Aladdin's genie. We don't even maintain research laboratories in the scientific sense. We simply make the best possible use of modern advances in communication and organization to do what already *can* be done." He waved a hand at the far wall, on which there was cut in intaglio the time-honored trade-mark of the business—a Scottie dog, pulling against a leash and sniffing at a post. "*There* is the spirit of the sort of work we do. We walk dogs for people who are too busy to walk 'em themselves. My grandfather worked his way through college walking dogs. I'm still walking them. I don't promise miracles, nor monkey with politics."

Beaumont fitted his fingertips carefully together. "You walk dogs for a fee? But of course you do—you walk my pair. Five minim-credits seems rather cheap."

"It is. But a hundred thousand dogs, twice a day, soon runs up the gross take."

"The 'take' for walking this 'dog' would be considerable."

"How much?" asked Francis. It was his first sign of interest.

Beaumont turned his eyes on him. "My dear sir, the outcome of this—ah—round table should make a difference of literally hundreds of billions of credits to this planet. We will not bind the mouth of the kine that treads the corn, if you pardon the figure of speech."

"How much?"

"Would thirty percent over cost be reasonable?"

Francis shook his head. "Might not come to much."

"Well, I certainly won't haggle. Suppose we leave it up to you gentlemen—your pardon, Miss Cormet!—to decide what the service is worth. I think I can rely on your planetary and facial patriotism to make it reasonable and proper."

Francis sat back, said nothing, but looked pleased.

"Wait a minute," protested Clare. "We haven't taken this job."

"We have discussed the fee," observed Beaumont.

Clare looked from Francis to Grace Cormet, then examined his fingernails. "Give me twenty-four hours to find out whether or not it is possible," he said finally, "and I'll tell you whether or not we will walk your dog."

"I feel sure," answered Beaumont, "that you will." He gathered his cape about him.

“O.K., master minds,” said Clare bitterly, “you’ve bought it.”

“I’ve been wanting to get back to field work,” said Grace.

“Put a crew on everything but the gravity problem,” suggested Francis. “It’s the only catch. The rest is routine.”

“Certainly,” agreed Clare, “but you had better deliver on that. If you can’t, we are out some mighty expensive preparations that we will never be paid for. What do you want? Grace?”

“I suppose so,” answered Francis. “She can count up to ten.”

Grace Cormet looked at him coldly. “There are times, Sance Francis, when I regret having married you.”

“Keep your domestic affairs out of the office,” warned Clare. “Where do you start?”

“Let’s find out who knows most about gravitation,” decided Francis. “Grace, better get Dr. Krathwohl on the screen.”

“Right,” she acknowledged, as she stepped to the stereo controls. “That’s the beauty about this business. You don’t have to know anything; you just have to know where to find out.”

Dr. Krathwohl was a part of the permanent staff of General Services. He had no assigned duties. The company found it worth while to support him in comfort while providing him with an unlimited drawing account for scientific journals and for attendance at the meetings which the learned hold from time to time. Dr. Krathwohl lacked the single-minded drive of the research scientist; he was a dilettante by nature.

Occasionally they asked him a question. It paid.

“Oh, hello, my dear!” Dr. Krathwohl’s gentle face smiled out at her from the screen. “Look—I’ve just come across the most amusing fact in the latest issue of *Nature*. It throws a most interesting side light on Brownlee’s theory of—”

“Just a second, doc,” she interrupted. “I’m kinda in a hurry.”

“Yes, my dear?”

“Who knows the most about gravitation?”

“In what way do you mean that? Do you want an astrophysicist, or do you want to deal with the subject from a standpoint of theoretical mechanics? Farquarson would be the man in the first instance, I suppose.”

“I want to know what makes it tick.”

“Field theory, eh? In that case you don’t want Farquarson. He is a descriptive ballisticians, primarily.

Dr. Julian’s work in that subject is authoritative, possibly definitive.”

“Where can we get hold of him?”

“Oh, but you can’t. He died last year, poor fellow. A great loss.” Grace refrained from telling him how great a loss and asked, “Who stepped into his shoes?”

“Who what? Oh, you were jesting! I see. You want the name of the present top man in field theory. I would say O’Neil.”

“Where is he?”

“I’ll have to find out. I know him slightly—a difficult man.”

“Do, please. In the meantime, who could coach us a bit on what it’s all about?”

“Why don’t you try young Carson, in our engineering department? He was interested in such things before he took a job with us. Intelligent chap—I’ve had many an interesting talk with him.”

“I’ll do that. Thanks, doc. Call the chief’s office as soon as you have located O’Neil. Speed.” She cut off.

CARSON AGREED with Krathwohl's opinion, but looked dubious. "O'Neil is not exactly co-operative. I've worked under him. But he undoubtedly knows more about field theory and space structure than any other living man."

Carson had been taken into the inner circle, the problem explained to him. He had admitted that he saw no solution. "Maybe we are making something hard out of this," Clare suggested. "I've got some ideas. Check me if I'm wrong, Carson."

"Go ahead, chief."

"Well, the acceleration of gravity is produced by the proximity of a mass—right? Earth-normal gravity being produced by the proximity of the Earth. Well, what would be the effect of placing a large mass just over a particular point on the Earth's surface. Would not that serve to counteract the pull of the Earth?"

"Theoretically, yes. But it would have to be a damn big mass."

"No matter."

"You don't understand, chief. To offset fully the pull of the Earth at a given point would require another planet the size of the Earth in contact with the Earth at that point. Of course, since you don't want to cancel the pull completely, but simply reduce it, you gain a certain advantage through using a smaller mass, which would have its center of gravity closer to the point in question than would be the center of gravity of the Earth. Not enough, though. While the attraction builds up inversely as the square of the distance—in this case the half diameter—the mass and the consequent attraction drops off directly as the *cube* of the diameter."

"What does that give us?"

Carson produced a slide rule and figured for a few moments. He looked up. "I'm almost afraid to answer. You would need a good-sized asteroid, of solid lead, to get anywhere at all."

"Asteroids have been moved before this."

"Yes, but what is to *hold it up*? No, chief, there is no conceivable source of power, or means of applying it, that would enable you to hang a big planetoid over a particular spot on the Earth surface and keep it there."

"Well, it was a good idea while it lasted," Clare said pensively.

Grace's smooth brow had been wrinkled as she followed the discussion. Now she put in, "I gathered that you could use an extremely heavy small mass more effectively, I seem to have read some where about some stuff that weighs *tom* per cubic inch."

"The core of dwarf stars," agreed Carson. "All we would need for that would be a ship capable of going light years in a few days, some way to mine the interior of a star, and a new space-time theory."

"Oh, well, skip it."

"Wait a minute," Francis observed. "Magnetism is a lot like gravity, isn't it?"

"Well—yes."

"Could there be some way to *magnetize* these gazabos from the little planets? Maybe something odd about their body chemistry?"

"Nice idea," agreed Carson, "but while their internal economy is odd, it's not that odd. They are still organic."

"I suppose not. If pigs had wings, they'd be pigeons."

The stereo annunciator blinked. Dr. Krathwohl announced that O'Neil could be found at his summer home in Portage, Wisconsin. He had not screened him and would prefer not to do so, unless the chief insisted.

Clare thanked him and turned back to the others, "We are wasting time," he announced. "After years in this business we should know better than to try to decide technical questions. I'm not a physicist and I don't, give a damn how

gravitation works. That's O'Neil's business. And Carson's. Carson, shoot up to Wisconsin and get O'Neil on the job."

"Me?"

"You. You're an operator for this job—with pay to match. Bounce over to the port—there will be a rocket and a credit facsimile waiting for you. You ought to be able to raise ground in seven or eight minutes." Carson blinked. "How about my job here?"

"The engineering department will be told, likewise the accounting. Get going."

Without replying, Carson headed for the door. By the time he reached it he was hurrying.

CARSON'S departure left them with nothing to do until he reported back—nothing to do, that is, but to start action on the manifold details of reproducing the physical and cultural details of three other planets and four major satellites, exclusive of their characteristic surface-normal gravitational accelerations. The assignment, although new, presented no real difficulties—to General Services. Somewhere there were persons who knew all the answers to these matters. The vast, loose organization called General Services was geared to find them, hire them, put them to work. Any of the unlimited operators and a considerable percent of the catalogue operators could take such an assignment and handle it without excitement or hurry.

Francis called in one unlimited operator. He did not even bother to select him, but took the first available on the ready panel—they were all "Can do!" people. He explained in detail the assignment, then promptly forgot it. It would be done, and on time. The punched-card machines would chatter a bit louder, stereo screens would flash, and bright young people in all parts of the Earth would drop what they were doing and dig out the specialists who would do the actual work.

He turned back to Clare, who said, "I wish I knew what Beaumont is up to. Conference of scientists—phooey!"

"I thought you weren't interested in politics, Jay."

"I'm not. I don't give a hoop about politics, interplanetary or otherwise, except as it affects this business. But if I knew what was being planned, we might be able to squeeze a bigger cut out of it."

"Well," put in Grace, "I think you can take it for granted that the real heavyweights from all the planets are about to meet and divide Gaul into three parts."

"Yes, but who gets cut out?"

"Mars, I suppose."

"Seems likely. With a bone tossed to the Venusians. In that case we might speculate a little in Pan-Jovian Trading Corp."

"Easy, son, easy," Francis warned. "Do that and you might get people interested. This is a hush-hush job."

"I guess you're right. Still, keep your eyes open. There ought to be some way to cut a slice of pie before this is over."

Grace Cormet's telephone buzzed. She took it out of her pocket and said, "Yes?"

"A Mrs. Hogbein Johnson wants to speak to you."

"You handle her. I'm off the board."

"She won't talk to anyone but you."

"All right. Put her on the chief's stereo, but stay in parallel yourself. You'll handle it after I've talked to her."

The screen came to life, showing Mrs. Johnson's fleshy face alone, framed in the middle of the screen in flat picture. "Oh, Miss Cormet," she moaned, "some dreadful mistake has been made. There is no stereo on this ship."

"It will be installed in Cincinnati, That will be in about twenty minutes."

"You are *sure*?"

"Quite sure."

"Oh, thank you! It's such a relief to talk with you. Do you know, I'm *thinking* of making you my social secretary."

"Thank you," Grace replied evenly, "but I am under contract."

"But how stupidly tiresome! You can break it."

"No, I'm sorry, Mrs. Johnson. Good-by." She switched off the screen and spoke again into her telephone. "Tell accounting to double her fee. And I *won't* speak with her again." She cut off and shoved the little instrument savagely back into her pocket. "Social secretary!"

IT WAS after dinner and Clare had retired to his living apartment in the tower of the building before Carson called back. Francis took the call in his own office.

"Any luck?" he asked when Carson's image had built up.

"Quite a bit. I've seen O'Neil."

"Well? Will he do it?"

"You mean can he do it, don't you?"

"Well—can he?"

"Now that is a funny thing—I didn't think it was theoretically possible. But after talking with him I'm convinced that it is. O'Neil has a new outlook on field theory—stuff he's never published. The man is a genius."

"I don't care," said Francis, "whether he's a genius or a Mongolian idiot—can he build some sort of gravity thinner-outer?"

"I believe he can. I really do believe he can."

"Fine. You hired him?"

"No. That's the hitch. That's why I called back. It's like this: I happened to catch him in a mellow mood, and because we had worked together once before, and because I had not aroused his ire quite as frequently as his other assistants, he invited me to stay for dinner. We talked about a lot of things—you can't hurry him—and I broached the proposition. It interested him mildly—the idea, I mean; not the proposition—and he discussed the theory with me—or, rather, at me. But he won't work on it."

"Why not? You didn't offer him enough money. I guess I'd better tackle him."

"No. Mr. Francis, no. You don't understand. He's not interested in money. He's independently wealthy and has more than he needs for his research, or anything else he wants. But just at present he is busy on wave-mechanics theory, and he just won't be bothered with anything else."

"Did you make him realize it was important?"

"Yes and no. Mostly no. I tried to, but there isn't anything important to him but what *lie* wants. It's a sort of intellectual snobbishness. Other people simply don't count."

"All right," said Francis. "You've done well so far. Here's what you do: After I switch off, you call executive and make a transcript of everything you can remember of what he said about gravitational theory. We'll hire the next best men, feed it to them, and see if it gives them any ideas to work on. In the meantime, I'll put a crew to work on the details of Dr. O'Neil's background. He'll have a weak point somewhere; it's just a matter of finding it. Maybe he's keeping a woman somewhere—"

"He's long past that."

“—or maybe he has a by-blow stacked away somewhere. We’ll see. I want you to stay there in Portage. Since you can’t hire him, maybe you can persuade him to hire you. You’re our pipe line; I want it kept open. We’ve got to find something he wants, or something he is afraid of.”

“He’s not afraid of *anything*. I’m positive of that.”

“Then he wants something. If it’s not money, or women, it’s something else. Everybody wants something. It’s a law of nature.”

“I doubt it,” Carson replied slowly. “Say! Did I tell you about his hobby?”

“No. What is it?”

“It’s china. In particular, Ming china. He has the best collection in the world, I’d guess. But I know what he wants!”

“Well, spill it, man; spill it. Don’t be dramatic.”

“It’s a little china dish, or bowl, about four inches across and two inches high. It’s got a Chinese name that means ‘Flower of Forgetfulness’.”

“Hm-m-m—doesn’t seem significant. You think he wants it pretty bad?”

“I *know* he does. He has a solid colorgraph of it in his study, where he can look at it. But it hurts him to talk about it.”

“Find out who owns it and where it is.”

“I know. British Museum. That’s why he can’t buy it.”

“So?” mused Francis. “Well, you can forget it. Carry on.”

CLARE CAME DOWN to Francis’ office and the three talked it over. “I guess we’ll need Beaumont on this,” was his comment when he had heard the report. “It will take the government to get anything loose from the British Museum.” Francis looked morose. “Well—what’s eating you? What’s wrong with that?”

“I know,” offered Grace. “You remember the treaty under which Great Britain entered the planetary confederation?”

“I was never much good at history.”

“It comes to this: I doubt if the planetary government can touch any thing that belongs to the museum without asking the British Parliament.”

“Why not? Treaty or no treaty, the planetary government is sovereign. That was established in the Brazilian incident.”

“Yeah, sure. But it could cause questions to be asked in the House of Commons, and that would lead to the one thing Beaumont wants to avoid at all costs—publicity.”

“O.K. What do you propose?”

“I’d say that Sance and I had better slide over to England and find out just how tight they have the ‘Flower of Forgetfulness’ welded down—and who does the welding and what his weaknesses are.” Clare’s eyes traveled past her to Francis, who was looking blank in the fashion that indicated assent to his intimates. “O.K.,” agreed Clare, “it’s your baby. Taking a special?”

“No, we’ve got time to get the midnight out of New York. By-by.”

“By, call me tomorrow.”

WHEN GRACE screened the chief the next day he took one look at her and exclaimed, “Good grief, kid! What have you done to your hair?”

“We located the guy,” she explained succinctly. “His weakness is blondes.”

“You’ve had your skin bleached, too.”

“Of course. How do you like it?”

“It’s stupendous;—though I preferred you the way you were. But what does Sauce think of it?”

“He doesn’t mind—it’s business. But to get down to cases, chief, there isn’t much to report. This will have to be a left-handed job. In the ordinary way, it would take an earthquake to get anything out of that tomb.”

“Don’t do anything that can’t be fixed!”

“You know me, chief. I won’t get you in trouble. But it will be expensive.”

“Of course.”

“That’s all for now. I’ll screen tomorrow.”

She was a brunette again the next day. “What is this?” asked Clare. “A masquerade?”

“I wasn’t the blonde he was weak for,” she explained, “but I found the one he was interested in.”

“Did it work out?”

“I think it will. Sance is having a facsimile integrated now. With luck, we’ll see you tomorrow.”

They showed up the next day, apparently empty-handed. “Well?” said Clare. “Well?”

“Seal the place up, Jay,” suggested Francis. “Then we’ll talk.”

Clare flipped a switch controlling an interference shield which rendered his office somewhat more private than a coffin. “How about it?” he demanded. “Did you get it?”

“Show it to him, Grace.”

Grace turned her back, fumbled at her clothing for a moment, then turned around and placed it gently on the chief’s desk.

It was not that it was beautiful—it *was* beauty. Its subtle, simple curve had no ornamentation, decoration would have sullied it. One spoke softly in its presence, for fear a sudden noise would shatter it.

Clare reached out to touch it, then thought better of it and drew his hand back. But he bent his head over it and stared down into it. It was strangely hard to focus—to allocate—the bottom of the bowl. It seemed as if his sight sank deeper and ever deeper into it, as if he were drowning in a pool of light.

He jerked up his head and blinked. “I didn’t know such things existed,” he whispered.

He looked at Grace and looked away to Francis. Francis had tears in his eyes, or perhaps his own were blurred.

“Look, chief,” said Francis. “Look—couldn’t we just keep it and call the whole thing off?”

“THERE’S no use talking about it any longer,” said Francis wearily. “We can’t keep it, chief. I should not have suggested it, and you shouldn’t have listened to me. Let’s screen O’Neil.”

“We might just wait another day before we do anything about it,” Clare ventured. His eyes returned yet again to the “Flower of Forgetfulness.”

Grace shook her head. “No good. It will just be harder tomorrow. I *know*.” She walked decisively over to the stereo and manipulated the controls.

O’Neil was annoyed at being disturbed and twice annoyed that they had used the emergency signal to call him to his disconnected screen.

“What is this?” he demanded. “What do you mean by disturbing a private citizen when he has disconnected? Speak up—and it had better be good, or, so help me, I’ll sue you!”

“We want you to do a little job of work for us, doctor,” Clare began evenly.

“What!” O’Neil seemed almost too surprised to be angry. “Do you mean to stand there, sir, and tell me that you have invaded the privacy of my home to ask *me* to work for *you*?”

"The pay will be satisfactory to you."

O'Neil seemed to be counting up to ten before answering. "Sir," he said carefully, "there are men in the world who seem to think they can buy anything, or anybody. I grant you that they have much to go on in that belief. But I am not for sale. Since you seem to be one of those persons, I will do my best to make this interview expensive for you. You will hear from my attorneys. Good night!"

"Wait a moment," Clare said urgently. "I believe that you are interested in china—"

"What if I am?"

"Show it to him, Grace."

Grace brought the "Flower of Forgetfulness" up near the screen, handling it carefully, reverently.

O'Neil said nothing. He leaned forward and stared. He seemed to be about to climb through the screen. "Where did you get it?" he said at last.

"That doesn't matter."

"I'll buy it from you—at your own price."

"It's not for sale. But you may have it—if we can reach an agreement."

O'Neil eyed him. "It's stolen property."

"You're mistaken. Nor will you find anyone to take an interest in such a charge. Now about this job we want—"

O'Neil pulled his eyes away from the bowl. "What is it, you wish me to do?"

Clare explained the problem to him. When he had concluded, O'Neil shook his head. "That's ridiculous," he said.

"We have reason to feel that it is theoretically possible."

"Oh, certainly! It's theoretically possible to live forever, too. But no one has ever managed it."

"We think you can do it."

"Thank you for nothing. Say!" O'Neil stabbed a finger at him out of the screen. "You set that young pup Carson on me!"

"He was acting under my orders."

"Then, sir, I do not like your manners."

"How about the job? And this?" Clare indicated the bowl.

O'Neil gazed at it and chewed his whiskers. "Suppose," he said at last, "I make an honest attempt to the full extent of my ability, to supply what you want—and I fail."

Clare shook his head. "We pay only for results. Oh, your salary, of course, but not *this*. This is a bonus in addition to your salary *if* you are successful."

O'Neil seemed about to agree, then said suddenly. "You may be fooling me with a colorgraph. I can't tell through this damned screen."

Clare shrugged. "Come see for yourself."

"I will. I shall. Stay where you are. Where are you? Damn it, sir, what's your name?"

He came storming in two hours later. "You've tricked me! The Flower is still in England. I've investigated. I'll . . . I'll *punish* you, sir, with my own two hands."

"See for yourself," answered Clare. He stepped aside so that his body no longer obscured O'Neil's view of Clare's desk top.

They let him look. They respected his need for quiet and let him look. After a long time he turned to them, but did not speak.

"Well?" asked Clare.

"I'll build your damned gadget," he said huskily. "I figured out an approach on the way here."

BEAUMONT came in person to call the day before the first session of the conference. "Just a social call, Mr. Clare," he stated. "I simply wanted to express to you my personal appreciation for the work you have done. And to deliver this."

"This" turned out to be a draft on the Bank Central for the agreed fee. Clare accepted it, glanced at it, nodded, and placed it on his desk.

"I take it, then," he remarked, "that the government is satisfied with the service rendered."

"That is putting it conservatively," Beaumont assured him, "To be perfectly truthful, I did not think you could do so much. You seem to have thought of everything. The Callistan delegation is out now, riding around and seeing the sights in one of the little tanks you had prepared. They are delighted. Confidentially, I think we can depend on their vote in the coming sessions."

"Gravity shields working all right, eh?"

"Perfectly, I stepped into their sightseeing tank before we turned it over to them. I was as light as the proverbial feather. Too light—I was very nearly spacesick." He smiled in wry amusement. "I entered the Jovian apartments, too. That was quite another matter."

"Yes, it would be," Clare agreed. "Two and a half times normal weight is oppressive, to say the least."

"It's a happy ending to a difficult task. I must be going. Oh, yes, one other little matter—I've discussed with Dr. O'Neil the possibility that the administration may be interested in other uses for his new development. In order to simplify the matter, it seems desirable that you provide me with a quitclaim to the O'Neil effect from General Services." Clare gazed thoughtfully at the Weeping Buddha and chewed his thumb. "No," he said slowly, "no. I'm afraid that would be difficult."

"Why not?" asked Beaumont. "It avoids the necessity of adjudication and attendant waste of time. We are prepared to recognize your service and recompense you."

"Hm-m-m. I don't believe you fully understand the situation, Mr. Beaumont. There is a certain amount of open territory between our contract with Dr. O'Neil and your contract with us. You asked of us certain services and certain chattels with which to achieve that service. We provided them—for a fee. All done. But our contract with Dr. O'Neil made him a full-time employee for the period of his employment. His research results and the patents embodying them are the property of General Services."

"Really?" said Beaumont. "Dr. O'Neill has a different impression."

"Dr. O'Neil is mistaken. Seriously, Mr. Beaumont—you asked us to develop a siege gun, figuratively speaking, to shoot a gnat. Did you expect us, as businessmen, to throw away the siege gun after one shot?"

"No, I suppose not. What do you propose to do?"

"We expect to exploit the gravity modulator commercially. I fancy we could get quite a good price for certain adaptations of it on Mars."

"Yes. Yes, I suppose you could. But to be brutally frank, Mr. Clare, I am afraid that is impossible. It is a matter of imperative public policy that this development be limited to terrestrials. In fact, the administration would find it necessary to intervene and make it government monopoly."

"Have you considered how to keep O'Neil quiet?"

"In view of the change in circumstances, no. What is your thought?"

"A corporation, in which he would hold a block of stock and be president. One of our bright young men would be chairman of the board." Clare thought of Carson. "There would be stock enough to go around," he added, and watched Beaumont's face.

Beaumont ignored the bait. "I suppose that this corporation would be under contract to the government—its sole customer?"

"That is the idea."

"Hm-m-m—yes, it seems feasible. Perhaps I had better speak with Dr. O'Neil."

"Help yourself."

BEAUMONT got O'Neil on the screen and talked with him in low tones. Or, more properly, Beaumont's tones were low. O'Neil displayed a tendency to blast the microphone. Clare sent for Francis and Grace and explained to them what had taken place.

Beaumont turned away from the screen. "The doctor wishes to speak with you, Mr. Clare."

O'Neil looked at him frigidly. "What is this claptrap I've had to listen to, sir? What's this about the O'Neil effect being your property?"

"It was in your contract, doctor. Don't you recall?"

"Contract! I never read the damn thing. But I can tell you this: I'll take you to court. I'll tie you in knots before I'll let you make a fool of me that way."

"Just a moment, doctor, please!" Clare soothed. "We have no desire to take advantage of a mere legal technicality, and no one disputes your interest. Let me outline what I had in mind—" He ran rapidly over the plan. O'Neil listened, but his expression was still unmollified at the conclusion.

"I'm not interested," he said gruffly. "So far as I am concerned, the government can have the whole thing. And I'll see to it."

"I had not mentioned one other condition," added Clare.

"Don't bother."

"I must. This will be just a matter of agreement between gentlemen, but it is essential. You have custody of the Flower of Forgetfulness." O'Neil was at once on guard. "What do you mean, 'custody'? I own it. Understand me—*own* it!"

"'Own it,' " repeated Clare. "Nevertheless, in return for the concessions we are making you with respect to your contract, we want something in return."

"What?" asked O'Neil. The mention of the bowl had upset his confidence.

"You own it and you retain possession of it. But I want your word that I, or Mr. Francis, or Miss Cormet, may come look at it from time to time—frequently."

O'Neil looked unbelieving. "You mean that you simply want to come to *look* at it?"

"That's all."

"Simply to *enjoy* it?"

"That's right."

O'Neil looked at him with new respect. "I did not understand you before, Mr. Clare. I apologize. As for the corporation nonsense—do as you like. I don't care. You and Mr. Francis and Miss Cormet may come to see the Flower whenever you like. You have my word."

"Thank you, Dr. O'Neil—for all of us," He switched off as quickly as could be managed gracefully.

Beaumont was looking at Clare with added respect, too. "I think," he said, "that the next time I shall not interfere with your handling of the details. I'll take my leave. Adieu, gentlemen—and Miss Cormet."

When the door had rolled down behind him, Grace remarked, "That seems to polish it off."

"Yes," said Clare. "We've 'walked his dog' for him; O'Neil has what he wants; Beaumont got what he wanted, and more besides."

“Just what is he after?”

“I don’t know, but I suspect that he would like to be first president of the Solar System Federation, if and when there is such a thing. With the aces we have dumped in his lap, he might make it. Do you realize the potentialities of the O’Neil effect?”

“Vaguely,” said Francis.

“Have you thought about what it will do to space navigation? Or the possibilities it adds in the way of colonization? Or its recreational uses? There’s a fortune in that alone.”

“What do we get out of it?”

“What do we get out of it? Money, old son. Gobs and gobs of money. There’s always money in giving people what they want.” He glanced up at the Scottie-dog trademark.

“Money,” repeated Francis. “Yeah, I suppose so.”

“Anyhow,” added Grace, “we can always go look at the Flower.”

LET THERE BE LIGHT

ARCHIBALD DOUGLAS, Sc.D., AA Ph.D., B.S., read the telegram with unconcealed annoyance.

“ARRIVING CITY LATE TODAY STOP DESIRE CONFERENCE COLD LIGHT YOUR LABORATORY TEN PM (signed) DR. M.L. MARTIN”

He was, was he? He did, did he? What did he think this lab was; a hotel? And did Martin think that his time was at the disposal of any Joe Doakes who had the price of a telegram? He had framed in his mind an urbanely discouraging reply when he noticed that the message had been filed at a mid-western airport. Very well, let him arrive. Douglas had no intention of meeting him.

Nevertheless, his natural curiosity caused him to take down his copy of *Who’s Who in Science*, and look up the offender. There it was. Martin, M.L., bio-chemist and ecologist, P.D.Q., X.Y.Z., N.R.A., C.I.O.—enough degrees for six men. Hmmm—Director Guggenheim Orinoco Fauna Survey, Author; *Co-Lateral Symbiosis of the Boll Weevil*, and so on, through three inches of fine print. The old boy seemed to be a heavy-weight.

A little later Douglas surveyed himself in the mirror of the laboratory washroom. He took off a dirty laboratory smock, removed a comb from his vest pocket, and put a careful polish on his sleek black hair. An elaborately tailored checked jacket, a snap-brim hat, and he was ready for the street. He fingered the pale scar that stenciled the dark skin of one cheek.

Not bad, he thought, in spite of the scar. If it weren’t for the broken nose he would look like George Raft.

The restaurant where he dined alone was only partly filled. It wouldn’t become lively until after the theatres were out, but Douglas appreciated the hot swing band and the good food. Toward the end of his meal, a young woman walked past his table and sat down, facing him, one table away. He sized her up with care. Pretty fancy! Figure like a strip dancer, lots of corn-colored hair, nice complexion, and great big soft blue eyes. Rather dumb pan, but what could you expect?

He decided to invite her over for a drink. If things shaped up, Dr. Martin could go to the devil. He scribbled a note on the back of a menu, and signalled the waiter.

“Who is she, Leo? One of the entertainers?”

“No, M’sieur, I have not seen her before.”

Douglas relaxed, and waited for the results. He knew the come-hither look when he saw it, and he was sure of the outcome. The girl read his note and glanced over at him with a little smile. He returned it with interest. She borrowed a pencil from the waiter, and wrote on the menu. Presently Leo handed it to him.

“Sorry”—it read—“and thanks for the kind offer, but I am otherwise engaged.”

Douglas paid his bill and returned to the laboratory.

HIS laboratory was located on the top floor of his father’s factory. He left the outer door open and the elevator down in anticipation of Doctor Martin’s arrival, then he busied himself by trying to locate the cause of an irritating vibration in his centrifuge. Just at ten o’clock he heard the whir of the elevator. He reached the outer door of his office just as his visitor arrived.

Facing him was the honey-colored babe he had tried to pick up in the restaurant.

He was immediately indignant. “How the hell did you get here? Follow me?”

She froze up at once. “I have an appointment with Doctor Douglas. Please tell him that I am here.”

“The hell you have. What kind of a game is this?”

She controlled herself, but her face showed the effort. “I think Doctor Douglas is the best judge of that. Tell him I’m here—at once.”

“You’re looking at him. I’m Doctor Douglas.”

“You! I don’t believe it. You look more like a—a gangster.”

“I am, nevertheless. Now cut out the clowning, sister, and tell me what the racket is. What’s *your* name?”

“I am Doctor M.L. Martin.”

He looked completely astounded, then bellowed his amusement. “No foolin’? You wouldn’t kid your country cousin, would you? Come in, Doc, come in!” She followed him, suspicious as a strange dog, ready to fight at any provocation. She accepted a chair, then addressed him again. “Are you really Doctor Douglas?”

He grinned at her. “In the flesh—and I can prove it! How about you? I still think this is some kind of a badger game.” She froze up again. “What do you want?—my birth certificate?”

“You probably murdered Dr. Martin in the elevator, and stuffed the old boy’s body down the shaft.”

She rose, gathered up her gloves and purse, and prepared to leave. “I came fifteen hundred miles for this meeting. I’m sorry I bothered. Good evening, Doctor Douglas.”

He was instantly soothing. “Aw, don’t get sore—I was just needling you. It simply tickled me that the distinguished Doctor Martin should look so much like Sally Rand. Now sit back down”—he gently disengaged her hands from her gloves—“and let me give you that drink you turned down earlier.”

She hesitated, still determined to be angry, then her natural good nature came to his aid, and she relaxed. “OK, Butch.”

“That’s better. What’ll it be; Scotch or Bourbon?”

“Make mine Bourbon—and not too much water.”

By the time the drinks were fixed and cigarets lighted the tension was lifted. “Tell me,” he began, “to what do I owe this visit? I don’t know a damn thing about biology.”

She blew a smoke ring and poked a carmine finger nail through it. "You remember that article you had in the April *Physical Review*? The one about cold light, and possible ways of achieving it?" He nodded. "*Electroluminescence vs. Chemiluminescence*: not much in that to interest a biologist."

"Nevertheless, I've been working on the same problem."

"From what angle?"

"I've been trying to find out how a lightning bug does the trick. I saw some gaudy ones down in South America, and they got me to thinking."

"Hmm—Maybe you got something. What have you found out?"

"Not much that wasn't already known. As you probably know, the firefly is an almost incredibly efficient source of light—at least 96 percent efficient. Now how efficient would you say the ordinary commercial tungsten-filament incandescent lamp is?"

"Not over two percent at the best."

"That's fair enough. And a stupid little beetle does fifty times as well without turning a hair. We don't look so hot, do we?"

"Not very," he acknowledged, "Go on about the bug."

"Well, the firefly has in his tummy an active organic compound—very complex—called luciferin. When this oxydises in the presence of a catalyst, luciferase, the entire energy of oxydation is converted into green light—no heat. Reduce it with hydrogen and it's ready to go again. I've learned how to do it in the laboratory."

"The hell you have! Congratulations! You don't need me. I can close up shop."

"Not so fast. It isn't commercially feasible; it takes too much gear to make it work; it's too messy; and I can't get an intense light. Now I came to see you to see if we might combine forces, pool our information, and work out something practical."

THREE weeks later at four in the morning Doctor M. L. Martin—Mary Lou to her friends—was frying an egg over a bunsen burner. She was dressed in a long rubber shop apron over shorts and a sweater. Her long hair hung in loose ripples. The expanse of shapely leg made her look like something out of *La Vie Parisienne*.

She turned to where Douglas lay sprawled, a wretched, exhausted heap, in a big arm chair. "Listen, Ape, the percolator seems to have burnt out. Shall I make the coffee in the fractional distillator?"

"I thought you had snake venom in it."

"So I have. I'll rinse it out."

"Good God, woman I Don't you care what chances you take with yourself—or with me?"

"Pooh—snake venom wouldn't hurt you even if you did drink it—unless that rotgut you drink has given you stomach ulcers. Soup's on!"

She chucked aside the apron, sat down and crossed her legs. He automatically took in the display.

"Mary Lou, you lewd wench, why don't you wear some clothes around the shop? You arouse my romantic nature."

"Nuts. You haven't any. Let's get down to cases. Where do we stand?"

He ran a hand through his hair and chewed his lip. "Up against a stone wall, I think. Nothing we've tried so far seems to offer any promise."

"The problem seems to be essentially one of confining radiant energy to the visible band of frequency."

"You make it sound so simple, Bright Eyes."

“Stow the sarcasm. That is, nevertheless, where the loss comes in with ordinary electric light. The filament is white hot, maybe two percent of the power is turned into light, the rest goes into infrared and ultra-violet.”

“So beautiful. So true,” he sighed.

Mary Lou stamped her feet in well-mimicked anger.

“Pay attention, you big ape. I know you’re tired, but listen to mother. There should be some way of sharply tuning the wave length. How about the way they do it in radio?”

He perked up a little. “Wouldn’t apply to the case. Even if you could manage to work out an inductance-capacitance circuit with a natural resonant frequency within the visual band, it would require too much gear for each lighting unit, and if it got out of tune it wouldn’t give any light at all.”

“Is that the only way frequency is controlled?”

“Yes—well, practically. Some transmitting stations, especially amateurs, use a specially cut quartz crystal that has a natural frequency of its own to control wave length.”

“Then why can’t we cut a crystal that would have a natural frequency in the octave of visible light?”

He sat up very straight. “Great Scott, kid! I think you’ve hit it.”

He got up, and strode up and down, talking as he went.

“They use ordinary quartz crystal for the usual frequencies, and tourmaline for short wave broadcasting. The frequency of vibration depends directly on the way the crystal is cut. There is a simple formula—” He stopped, and took down a thick India-paper handbook. “Hmm—yes, here it is. For quartz, every millimetre of thickness of the crystal gives one hundred metres of wave length. Frequency is, of course, the reciprocal of wave length. Tourmaline has a similar formula for shorter wave lengths.”

He continued to read. “These crystals have the property of flexing when electric charges are applied to them, and vice versa, show an electric charge when flexed. The period of flexure is an inherent quality of the crystal, depending on its geometrical proportions. Hooked into a radio transmitting circuit, such a crystal requires the circuit to operate at one, and only one, frequency, that of the crystal.’ That’s it, kid, that’s it! Now if we can find a crystal that can be cut to vibrate at the frequency of visible light, we’ve got it—a way to turn electrical energy into light without heat losses!”

Mary Lou cluck-clucked admiringly. “Mama’s *good* boy. Mama knew he could do it, if he would only *try*.”

NEARLY six months later Douglas invited his father up to the laboratory to see the results. He ushered the mild, silver-haired old gentleman into the sanctum sanctorum and waved to Mary Lou to draw the shades. Then he pointed to the ceiling.

“There it is, Dad—cold light—at a bare fraction of the cost of ordinary lighting.”

The elder man looked up and saw, suspended from the ceiling a grey screen, about the size and shape of the top of a card table. Then Mary Lou threw a switch. The screen glowed brilliantly, but not dazzlingly, and exhibited a mother-of-pearl iridescence. The room was illuminated by strong white light without noticeable glare.

The young scientist grinned at his father, as pleased as a puppy who expects a pat. “How do you like it, Dad? One hundred candle power. That’d take about a hundred watts with ordinary bulbs, and we’re doing it with two watts—half an ampere at four volts.”

The old man blinked absent-mindedly at the display. "Very nice, son, very nice indeed. I'm pleased that you have perfected it."

"Look, Dad—do you know what that screen up there is made out of? Common, ordinary clay. It's an allotropic aluminum silicate; cheap and easy to make from any clay, or ore, that contains aluminum.

I can use Bauxite, or cryolite, or most anything. You can gather up the raw materials with a steam shovel in any state in the union."

"Is your process all finished, son, and ready to be patented?"

"Why, yes, I think so, Dad."

"Then let's go into your office, and sit down. I've something I must discuss with you. Ask your young lady to come, too." Young Douglas did as he was told, his mood subdued by his father's solemn manner. When they were seated, he spoke up.

"What's the trouble, Dad? Can I help?"

"I wish you could, Archie, but I'm afraid not. I'm going to have to ask you to close your laboratory."

The younger man took it without flinching. "Yes, Dad?"

"You know I've always been proud of your work, and since your mother passed on, my major purpose has been to supply you with the money and equipment you needed for your work."

"You've been very generous, Dad."

"I wanted to do it. But now a time has come when the factory won't support your research any longer. In fact, I may have to close the doors of the plant."

"As bad as that, Dad? I thought that orders had picked up this last quarter."

"We do have plenty of orders, but the business isn't making a profit on them. Do you remember I mentioned something to you about the public utilities bill that passed at the last session of the legislature?"

"I remember it vaguely, but I thought that the Governor vetoed it."

"He did, but they passed it over his veto. It was as bold a case of corruption as this state has ever seen—the power lobbyists had both houses bought, body and soul." The old man's voice trembled with impotent anger.

"And just how does it affect us, Dad?"

"This bill pretended to equalize power rates according to circumstances. What it actually did was to permit the commission to discriminate among consumers as they saw fit. You know what that commission is—I've always been on the wrong side of the fence politically. Now they are forcing me to the wall with power rates that prevent me from competing."

"But good heavens, Dad—They can't do that. Get an injunction!"

"In this state, son?" His white eyebrows raised.

"No, I guess not." He got to his feet and started walking the floor.

His father shook his head. "The thing that really makes me bitter is that they can do this with power that actually belongs to the people. The federal government's program has made plenty of cheap power possible—the country should be rich from it—but these local pirates have gotten hold of it, and use it as a club to intimidate free citizens."

AFTER the old gentleman had left, Mary Lou slipped over and laid a hand on Douglas' shoulder and looked down into his face.

"You poor boy!"

His face showed the upset he had concealed from his father. "Cripes, Mary Lou. Just when we were going good. But I mind it most for Dad."

"Yes, I know."

"And not a damn thing I can do about it. It's politics, and those pot-bellied racketeers own this state."

She looked disappointed and faintly scornful. "Why, Archie Douglas, you great big panty-waist. You aren't going to let those mugs get away with this without a fight, are you?"

He looked up at her dully. "No, of course not. I'll fight. But I know when I'm licked. This is way out of my field." She flounced across the room. "I'm surprised at you. You've just made the greatest invention since the dynamo, and you talk about being licked."

"Your invention, you mean."

"Nuts! Who worked out the allotropic forms? Who blended them to get the whole spectrum? And besides, you aren't out of your field. What's the problem?—Power! They're squeezing you for power. You're a physicist. Dope out some way to get power without buying from them."

"What would you like? Atomic disintegration?"

"Be practical."

"I might stick a windmill on the roof."

"That's better—but still not good. Now get busy with that knot in the end of your spinal cord. I'll start some coffee. This is going to be another all night job."

He grinned at her. "OK, Carrie Nation. I'm coming."

She smiled happily at him. "That's the way to talk."

He rose and went over to her, slipped an arm about her waist and kissed her. She relaxed to his embrace, but when their lips parted, she pushed him away.

"Archie, you remind me of the Al G. Barnes Circus; 'Every Act an Animal Act.' "

AS THE first light of dawn turned their faces pale and sickly, they were rigging two cold light screens face to face. Archie adjusted them until they were an inch apart.

"There now—practically all the light from the first screen should strike the second. Turn the power on the first screen, Sex Appeal."

She threw the switch. The first screen glowed with light, and shed its radiance on the second.

"Now to see if our beautiful theory is correct." He fastened a voltmeter across the terminals of the second screen and pressed the little black button in the base of the voltmeter. The needle sprang over to two volts.

She glanced anxiously over his shoulder. "How about it, guy?"

"It works! There's no doubt about it. These screens work both ways. Put juice in 'em; out comes light. Put light in 'em; out comes electricity."

"What's the power loss, Archie?"

"Just a moment." He hooked in an ammeter, read it, and picked up his slide rule. "Let me see—Loss is about thirty percent. Most of that would be the leakage of light around the edges of the screens."

"The sun's coming up, Archie. Let's take screen number two up on the roof, and try it out in the sunlight."

Some minutes later they had the second screen and the electrical measuring instruments on the roof. Archie propped the screen up against a sky-light so that it faced the rising sun, fastened the voltmeter across its terminals and took a reading.

The needle sprang at once to the two volt mark.

Mary Lou jumped up and down. "It works!"

"Had to work," commented Archie. "If the light from another screen will make it pour out juice, then sunlight is bound to. Hook in the ammeter. Let's see how much power we get."

The ammeter showed 18.7 amperes.

Mary Lou worked out the result on the slide rule. "Eighteen-point-seven times two gives thirty-seven-point-four watts or about five hundredths of a horsepower. That doesn't seem like very much. I had hoped for more."

"That's as it should be, kid. We are using only the visible light rays. As a light source the sun is about fifteen percent efficient; the other eighty-five percent are infra-red and ultra-violet. Gimme that slipstick." She passed him the slide rule. "The sun pours out about a horse power and a half, or one and one eighth kilowatts on every square yard of surface on the earth that is faced directly towards the sun. Atmospheric absorption cuts that down about a third, even at high noon over the Sahara desert. That would give one horsepower per square yard. With the sun just rising we might not get more than one-third horsepower per square yard here. At fifteen percent efficiency that would be about five hundredths of a horsepower. The screen is a yard square; it gives five hundredths of a horsepower. It checks. Q.E.D.—What are you looking so glum about?"

"Well—I had hoped that we could get enough sunpower off the roof to run the factory, but if it takes twenty square yards to get one horsepower, it won't be enough."

"Cheer up, Baby Face. We doped out a screen that would vibrate only in the band of visible light; I guess we can dope out another that will be atonic—one that will vibrate to any wave length. Then it will soak up any radiant energy that hits it, and give it up again as electrical power. With this roof surface we can get maybe a thousand horsepower at high noon. Then we'll have to set up banks of storage batteries, so that we can store power for cloudy days and night shifts when we're not producing any."

She blinked her big blue eyes at him. "Archie, does your head ever ache?"

TWENTY minutes later he was back at his desk, deep in the preliminary calculations, while Mary Lou threw together a scratch breakfast.

She interrupted his study to ask: "Where'd'ja hide that bottle, Lug?" He looked up and replied, "It's immoral for little girls to drink in broad daylight."

"Come out of the gutter, chum. I want to turn these hot-cakes into crepe Suzettes, using corn liquor instead of brandy."

"Never mind the creative cookery, Dr. Martin. I'll take mine straight. I need my health to finish this job."

She turned around and brandished the skillet at him. "To hear is to obey, my lord. However, Archie, you are an overeducated Neanderthal, with no feeling for the higher things of life."

"I won't argue the point, Blonde Stuff.—But take a gander at this. I've got the answer—a screen that vibrates all down the scale."

"No foolin', Archie?"

"No fooling, kid. It was already implied in our earlier experiments, but we were so busy trying to build a screen that wouldn't vibrate at random, we missed it. I ran onto something else, too."

"Tell mama!"

"We can build screens to radiate in the infra-red just as easily as cold light screens. Get it? Heating units of any convenient size or shape, economical and with no high wattage or extreme temperatures to make 'em fire hazards or dangerous to children. As I see it, we can design these screens to, one—" he ticked the points off on his fingers—"take power from the sun at nearly one hundred percent efficiency; two, deliver it as cold light; or three, as heat; or four, as electrical power. We can bank 'em in series to get any required voltage; we can bank in parallel to get any required current, and the power is absolutely free, except for installation costs."

She stood and watched him in silence for several seconds before speaking. “All that from trying to make a cheaper light. Come eat your breakfast, Steinmetz. You men can’t do your work on mush.”

THEY ate in silence, each busy with new thoughts. Finally Douglas spoke. “Mary Lou, do you realize just how big a thing this is?”

“I’ve been thinking about it.”

“It’s enormous. Look, the power that can be tapped is incredible. The sun pours over two hundred and thirty trillion horsepower onto the earth all the time and we use almost none of it.”

“As much as that, Archie?”

“I didn’t believe my own figures when I worked it out, so I looked it up in Moulton’s *Astronomy*. Why, we could recover more than twenty thousand horsepower in any city block. Do you know what that means? Free power! Riches for everybody! It’s the greatest thing since the steam engine.” He stopped suddenly, noticing her glum face. “What’s the matter, kid, am I wrong some place?”

She fiddled with her fork before replying. “No, Archie—you’re not wrong. I’ve been thinking about it, too. Decentralized cities, labor-saving machinery for everybody, luxuries—it’s all possible, but I’ve a feeling that we’re staring right into a mess of trouble. Did you ever hear of ‘Breakages Ltd.’?”

“What is it, a salvage concern?”

“Not by a hell of a sight. You ought to read something besides the ‘Proceedings of the American Society of Physical Engineers.’ George Bernard Shaw, for instance. It’s from the preface of *‘Back to Methuselah,’* and is a sardonic way of describing the combined power of corporate industry to resist any change that might threaten their dividends. You threaten the whole industrial set-up, son, and you’re in danger right where you’re sitting.”

He pushed back his chair. “Oh, surely not. You’re just tired and jumpy. Industry welcomes invention. Why, all the big corporations have their research departments with some of the best minds in the country working in them.”

“Sure they do—and any bright young inventor can get a job with them. And then he’s a kept man—the inventions belong to the corporation, and only those that fit into the pattern of the powers-that-be ever see light. The rest are shelved. Do you really think that they’d let a free lance like you upset an investment of billions of dollars?”

He frowned, then relaxed and laughed. “Oh, forget it, kid, it’s not that serious.”

“That’s what you think. Did you ever hear of celanese voile? Probably not. It’s a synthetic dress material used in place of chiffon. But it wore better and was washable, and it only cost about forty cents a yard, while chiffon costs four times as much. You can’t buy it any more.

“And take razor blades. My brother bought one about five years ago that never had to be re-sharpened. He’s still using it, but if he ever loses it, he’ll have to go back to the old kind. They took ’em off the market.

“Did you ever hear of guys who had found a better, cheaper fuel than gasoline? One showed up about four years ago and proved his claims—but he drowned a couple of weeks later in a swimming accident. I don’t say that he was murdered, but it’s damn funny that they never found his formula.

“**A**ND that reminds me—I saw a clipping from the *Los Angeles Illustrated Daily News* that was published early this year. A man bought a heavy standard make car in San Diego, filled her up and drove her to Los Angeles. He only used

two gallons. Then he drove to Agua Caliente and back to San Diego, and only used three gallons. About a week later the sales company found him and bribed him to make an exchange. By mistake they had let him have a car that wasn't to be sold—one with a trick carburetor.

"Do you know any big heavy cars that get seventy miles to the gallon? You're not likely to—not while 'Breakages Ltd.' rules the roost. But the story is absolutely kosher—you can look it up in the files.

"And of course, everybody knows that automobiles aren't built to wear, they're built to wear out, so you will buy a new one. They build 'em just as bad as the market will stand. Steamships take a worse beating than a car, and *they* last thirty years or more."

Douglas laughed it off. "Cut out the gloom, Sweetie Pie. You've got a persecution complex. Let's talk about something more cheerful—you and me, for instance. You make pretty good coffee. How about us taking out a license to live together?"

She ignored him.

"Well, why not. I'm young and healthy. You could do worse."

"Archie, did I ever tell you about the native chief that got a yen for me down in South America?"

"I don't think so. What about him?"

"He wanted me to marry him. He even offered to kill off his seventeen current wives and have them served up for the bridal feast."

"What's that got to do with my proposition?"

"I should have taken him up. A girl can't afford to turn down a good offer these days."

ARCHIE walked up and down the laboratory, smoking furiously. Mary Lou perched on a workbench and watched him with troubled eyes. When he stopped to light another cigaret from the butt of the last, she bid for attention.

"Well, Master Mind, what now?"

He finished lighting his cigaret, burned himself, cursed in a monotone, then replied, "Oh, you were right, Cassandra. We're in more trouble than I ever knew existed. First when we build an electric runabout that gets its power from the sun while its parked at the curb, somebody pours kerosene over it and burns it up. I didn't mind that so much—it was just a side issue. But when I refuse to sell out to them, they slap all those phoney law suits on us, and tie us up like a kid with the colic."

"They haven't a legal leg to stand on."

"I know that, but they've got unlimited money and we haven't. They can run these suits out for months—maybe years—only we can't last that long."

"What's our next move? Do you keep this appointment?"

"I don't want to. They'll try to buy me off again, and probably threaten me, in a refined way. I'd tell 'em to go to hell, if it wasn't for Dad. Somebody's broken into his house twice now, and he's too old to stand that sort of thing."

"I suppose all this labor trouble in the plant worries him, too."

"Of course it does. And since it dates from the time we started manufacturing the screens on a commercial scale, I'm sure it's part of the frame-up. Dad never had any labor trouble before. He always ran a union shop and treated his men like members of his own family. I don't blame him for being nervous. I'm getting tired of being followed everywhere I go, myself. It makes me jumpy."

Mary Lou puffed out a cloud of smoke. "I've been tailed the past couple of weeks."

"The hell you have! Mary Lou, that tears it. I'm going to settle this thing today."

"Going to sell out?"

"No." He walked over to his desk, opened a side drawer, took out a .38 automatic, and slipped it in his pocket. Mary Lou jumped down from the bench and ran to him. She put her hands on his shoulders, and looked up at him, fear in her face.

"Archie!"

He answered gently. "Yes, kid."

"Archie, don't do anything rash. If anything happened to you, you know damn well I couldn't get along with a normal man."

He patted her hair. "Those are the best words I've heard in weeks, kid."

DOUGLAS returned about one P.M.

Mary Lou met him at the elevator. "Well?"

"Same old song-and-dance. Nothing done in spite of my brave promises."

"Did they threaten you?"

"Not exactly. They asked me how much life insurance I carried."

"What did you tell them?"

"Nothing. I reached for my handkerchief and let them see that I was carrying a gun. I thought it might cause them to revise any immediate plans they might have in mind. After that the interview sort of fizzled out and I left. Mary's little lamb followed me home, as usual."

"Same plug-ugly that shadowed you yesterday?"

"Him, or his twin—He couldn't be a twin, though, come to think about it. They'd have both died of fright at birth."

"Have you had lunch?"

"Not yet. Let's ease down to the shop lunch room and take on some groceries. We can do our worrying later."

The lunch room was deserted. They talked very little. Mary Lou's blue eyes stared vacantly over his head. At the second cup of coffee she reached out and touched him.

"Archie, do you know the ancient Chinese advice to young ladies about to undergo criminal assault?"

"No, what is it?"

"Just one word: 'Relax.' That's what we've got to do."

"Speak English."

"I'll give you a blueprint. Why are we under attack?"

"We've got something they want."

"Not at all. We've got something they want to quarantine—they don't want anyone else to have it. So they try to buy you off, or scare you into quitting. If these don't work, they'll try something stronger. Now you're dangerous to them and in danger from them because you've got a secret? What happens if it isn't a secret? Suppose everybody knows it?"

"They'd be sore as hell."

"Yes, but what would they do? Nothing. Those big tycoons are practical men. They won't waste a dime on heckling you if it no longer serves their pocketbooks."

"What do you propose that we do?"

"Give away the secret. Tell the world how it's done. Let anybody manufacture power screens and light screens that wants to. The heat process on the allotrope is so simple that any commercial chemist can duplicate it once you tell 'em how, and there must be a thousand factories, at least, that could manufacture them with their present machinery from materials at their very doorsteps."

"But, good Lord, Mary Lou, we'd be left in the lurch."

“What can you lose? We’ve made a measly couple of thousand dollars so far, keeping the process secret. If you turn it loose, you still hold the patent, and you could charge a nominal royalty—one that it wouldn’t be worth while trying to beat, say ten cents a square yard on each screen manufactured. There would be millions of square yards turned out the first year—hundreds of thousands of dollars to you the first year, and a big income for life. You can have the finest research laboratory in the country.”

He slammed his napkin down on the table. “Kid, I believe you’re right.”

“Don’t forget, too, what you’ll be doing for the country. There’ll be factories springing up right away all over the Southwest—every place where there’s lots of sunshine. Free power! You’ll be the new emancipator.”

He stood up, his eyes shining. “Kid, we’ll do it! Half a minute while I tell Dad our decision, then we’ll beat it for town.”

TWO hours later the teletype in every news service office in the country was clicking out the story. Douglas insisted that the story include the technical details of the process as a condition of releasing it. By the time he and Mary Lou walked out of the Associated Press building the first extra was on the street: “GENIUS GRANTS GRATIS POWER TO PUBLIC.” Archie bought one and beckoned to the muscle man who was shadowing him.

“Come here, Sweetheart. You can quit pretending to be a fire-plug. I’ve an errand for you.” He handed the lunk the newspaper. It was accepted uneasily. In all his long and unsavory career he had never had the etiquette of shadowing treated in so cavalier a style. “Take this paper to your boss and tell him Archie Douglas sent him a valentine. Don’t stand there staring at me! Beat it, before I break your fat head!”

As Archie watched him disappear in the crowd, Mary Lou slipped a hand in his. “Feel better, son?”

“Lots.”

“All your worries over?”

“All but one.” He grabbed her shoulders and swung her around. “I’ve got an argument to settle with you. Come along!” He grabbed her wrist and pulled her out into the cross walk.

“What the hell, Archie! Let go my wrist.”

“Not likely. You see that building over there? That’s the court house. Right next to the window where they issue dog licenses, there’s one where we can get a wedding permit.”

“I’m not going to marry you!” she cried indignantly.

“The hell you aren’t. You’ve stayed all night in my laboratory a dozen times. I’m compromised. You’ve got to make an honest man of me—or I’ll start to scream right here in the street.”

“This is blackmail!”

As they entered the building, she was still dragging her feet—but not too hard.

REQUIEM

On a high hill in Samoa there is a grave. Inscribed on the marker are these words:

**“Under the widec and starry sky
Dig my grave and let me lie.**

**Glad did I live and gladly die
And I lay me down with a will!**

**“This be the verse yon grave for me:
Here he lies where he longed to be,
Home is the sailor, home from the sea,
And the hunter home from the hill.”**

These lines appear another place—scrawled on a shipping tag torn from a compressed-air container, and pinned to the ground until a knife.

It was not much of a fair, as fairs go. The trotting races didn't promise much excitement, even though several entries claimed the blood of the immortal Dan Patch. The tents and concession booths barely covered the circus grounds, and the pitchmen seemed discouraged.

D.D. Harriman's chauffeur could not see any reason for stopping. They were due in Kansas City for a directors' meeting; that is to say, Harriman was. The chauffeur had private reasons for promptness, reasons involving darktown society on Eighteenth Street. But the boss not only stopped; he hung around. He didn't seem much interested in the racetrack or sideshows, though.

Bunting and a canvas arch made the entrance to a large inclosure beyond the racetrack. Red and gold letters announced:

This way to the
MOON ROCKET!!!!
See it in actual flight!
Public Demonstration Flights
TWICE DAILY
This is the ACTUAL TYPE used by the
First Men to Reach the MOON!!
YOU can ride in it!!—\$25

A boy, nine or ten years old, hung around the entrance and stared at the posters.

“Want to see the ship, son?”

The kid's eyes shone. “Gee, mister, I sure would.”

“So would I. Come on.”

Harriman paid out fifty cents for two pink tickets which entitled him and the boy to enter the inclosure and examine the rocketship. The kid ran on ahead with the single-minded preoccupation of boyhood. Harriman looked over the stubby curved lines of the ovoid body. He noted with a professional eye that she was a single-jet type with fractional controls around her midriff. He squinted through his glasses at the name painted in gold on the carnival red of the body, Carefree. He paid another quarter to enter the control cabin.

WHEN his eyes had adjusted to the gloom caused by the strong ray filters of the ports, he let them rest lovingly on the keys of the console and the semicircle of dials above. Each beloved gadget was in its proper place. He knew them—graven in his heart.

While he mused over the instrument board, with the warm liquid of content soaking through his body, the pilot entered and touched his arm.

“Sorry, sir. We've got to cast loose for the flight.”

“Eh?” Harriman started, then looked at the speaker. Handsome devil, with a good skull and strong shoulders—reckless eyes and a self-indulgent mouth, but a firm chin. “Oh, excuse me, captain.”

“Quite all right.”

“Oh, I say, captain . . . er . . . uh—”

“McIntyre.”

“Captain McIntyre, could you take a passenger this trip?” The old man leaned eagerly toward him.

“Why, yes, if you wish. Come along with me.” He ushered Harriman into a shed marked “Office” which stood near the gate. “Passenger for a check-over, doc.”

Harriman permitted the medico to run a stethoscope over his thin chest and to strap a rubber bandage around his arm. Presently the doctor unstrapped it, glanced at McIntyre, and shook his head.

“No go, doc?”

“That’s right, captain.”

Harriman looked from face to face, his disappointment plain to see. “You won’t take me?”

The doctor shrugged his shoulders. “I couldn’t even guarantee that you would live through the take-off. You see, sir,” he continued, not unkindly, “it’s not only that your heart condition makes heavy acceleration dangerous, but at your age bones are brittle, highly calcified, and easily broken in the shock of take-off. Rocketry is a young man’s game.”

McIntyre added: “Sorry, sir. I’d like to, but the Bates County Fair Association pays the doctor here to see to it that I don’t take up anyone who might be hurt by the acceleration.”

The old man’s shoulders drooped miserably. “I rather expected it.”

“Sorry, sir.” McIntyre turned to go, but Harriman followed him out.

“Excuse me, captain—”

“Yes?”

“Could you and your . . . uh . . . engineer have dinner with me after your flight?”

The pilot looked at him quizzically. “I don’t see why not. Thanks.”

“CAPTAIN MCINTYRE, it is difficult for me to see why anyone would quit the Earth-Moon run,” said Harriman a few hours later. Fried chicken and hot biscuits in a private dining room of the best hotel the little town of Butler afforded, three-star Hennessey, and Corona Coronas had produced a friendly atmosphere, in which three men could talk freely.

“Well, I didn’t like it.”

“Aw, don’t give him that, Mac—you know damn well it was Rule G that got you.” McIntyre’s mechanic poured himself another brandy as he spoke.

McIntyre looked sullen. “Well, what if I did take a couple o’ drinks? Anyhow, I could have squared that—it was the damn persnickety regulations that got me fed up. Who are you to talk? Smuggler!”

“Sure, I smuggled! Who wouldn’t—with all those beautiful rocks just aching to be taken back to Earth? I had a diamond once as big as—But if I hadn’t been caught I’d be in Luna City tonight. And so would you, you drunken blaster—with the boys buying us drinks and the girls smiling and making suggestions—”

He put his face down and began to weep quietly.

McIntyre shook him. “He’s drunk.”

"Never mind." Harriman interposed a hand. "Tell me, are you really satisfied not to be on the run any more?" McIntyre chewed his lip. "No—he's right, of course. This barnstorming isn't what it's all cracked up to be. We've been hopping junk at every pumpkin doin's up and down the Mississippi Valley—sleeping in tourist camps, and eating at greaseburners. Half the time the sheriff has an attachment on the ship, the other half the Society for the Prevention of Something or Other gets an injunction to keep us on the ground. It's no sort of a life for a rocket man."

"Would it help any for you to get to the Moon?"

"Well—yes. I couldn't get back on the Earth-Moon run, but if I was in Luna City, I could get a job hopping ore for the company—they're always short of rocket pilots for that, and they wouldn't mind my record. If I kept my nose clean, they might even put me back on the run, in time."

Harriman fiddled with a spoon, then looked up. "Would you young gentlemen be open to a business proposition?"

"Perhaps. What is it?"

"You own the Carefree?"

"Yeah. That is, Charlie and I do—barring a couple of liens against her. What about it?"

"I want to charter her—for you and Charlie to take me to the Moon!"

Charlie sat up with a jerk. "D'joo hear what he said, Mac? He wants us to fly that old heap to the Moon!"

McIntyre shook his head. "Can't do it, Mr. Harriman. The old boat's worn out. We don't even use standard juice in her—just gasoline and liquid air. Charlie spends all of his time tinkering with her at that. She's going to blow up some day."

"SAY, Mr. Harriman," put in Charlie, "what's the matter with getting an excursion permit and going in a company ship?"

"No, son," the old man replied, "I can't do that. You know the conditions under which Congress granted the company a monopoly on lunar exploitation—no one to enter space who was not physically qualified to stand up under it. Company to take full responsibility for the safety and health of all citizens beyond the stratosphere. The official reason for granting the franchise was to stop the enormous loss of life that occurred during the first few years of rocket travel."

"And you can't pass the physical exam?"

Harriman shook his head.

"Well, what the hell—if you can afford to hire us, why don't you just bribe yourself a brace of company docs? It's been done before."

Harriman smiled ruefully. "I know it has. Charlie, but it won't work for me. You see. I'm a little too prominent. My full name is Delos D. Harriman."

"What? You are old D.D.? But, hell's bells, you own a big slice of the company yourself; you ought to be able to do anything you like, rules or no rules."

"That is not an unusual opinion, son, but it is incorrect. Rich men aren't more free than other men; they are less free—a good deal less free. I tried to do what you suggest, but the other directors would not permit me. They are afraid of losing their franchise. It costs them a good deal in—uh—political contact expenses to retain it, as it is."

"Well, I'll be a—Can you tie that, Mac? A guy with lots of dough, and he can't spend it the way he wants to." McIntyre did not answer, but waited for Harriman to continue.

"Captain McIntyre, if you had a ship, would you take me?"

McIntyre rubbed his chin. "It's against the law."

"I'd make it worth your while."

"Sure, he would, Mr. Harriman. Of course you would, Mac. Luna City! Oh, baby!"

"Why do you want to go to the Moon so badly, Mr. Harriman?"

"Captain, it's the one thing I've really wanted to do all my life—ever since I was a boy. I don't know whether I can explain it to you or not. You young fellows have grown up to rocket travel the way I grew up to aviation. I'm a great deal older than you are; maybe fifty years older. When I was a kid practically nobody believed that men would ever reach the Moon. You've seen rockets all your lives, and the first to reach the Moon got there before you were old enough to vote. When I was a boy they laughed at the idea.

"But I believed—I believed. I read Verne and Wells and Smith, and I believed that we could do it—that we would do it. I set my heart on being one of the men to walk the surface of the Moon, to see her other side, and to look back on the face of the Earth, hanging in the sky.

"I used to go without my lunches to pay my dues in the American Rocket Society, because I wanted to believe that I was helping to bring the day nearer when we would reach the Moon. I was already an old man when that day arrived. I've lived longer than I should, but I would not let myself die—I will not!—until I have set foot on the Moon."

McIntyre stood up and put out his hand. "You find a ship, Mr. Harriman. I'll drive 'er."

"Atta boy, Mac! I told you he would, Mr. Harriman."

HARRIMAN mused and dozed during the hour's run to the north into Kansas City, dozed in the light, troubled sleep of old age. Incidents out of a long life ran through his mind in vagrant dreams. There was that time—oh, yes, 1910—a little boy on a warm spring night. "What's that, daddy?"

"That's Halley's comet, sonny."

"Where did it come from?"

"I don't know, son. From way out in the sky somewhere."

"It's beyoooootiful, daddy. I want to touch it."

"'Fraid not, son."

"Delos, do you mean to stand there and tell me you put the money we had saved for the house into that crazy rocket company?"

"Now, Charlotte, please! It's not crazy; it's a sound business investment. Some day soon rockets will fill the sky. Ships and trains will be obsolete. Look what happened to the men that had the foresight to invest in Henry Ford."

"We've been all over this before."

"Charlotte, the day will come when men will rise up off the Earth and visit the Moon, even the planets. This is the beginning."

"Must you shout?"

"I'm sorry, but you—"

"I feel a headache coming on. Please try to be a little quiet when you come to bed."

He hadn't gone to bed. He had sat out on the veranda all night long, watching the full Moon move across the sky. There would be the devil to pay in the morning, the devil and a thin-lipped silence. But he'd stick by his guns. He'd given in on most things, but not on this. The night was his. Tonight he'd be alone with his old friend. He searched her face. Where was Mare Crisium?

Funny, he couldn't make it out. He used to be able to see it plainly when he was a hoy. Probably needed new glasses—this constant office work wasn't good for his eyes.

But he didn't need to see; he knew where they all were: Crisium, Mare Fecunditatis, Mare Tranquillitatis—that one had a satisfying roll!—the Apennines, the Carpathians, old Tycho with its mysterious rays.

Two hundred and forty thousand miles—ten times around the Earth. Surely men could bridge a little gap like that. Why, he could almost reach out and touch it, nodding there behind the elm trees.

Not that he could help to do it. He hadn't the education.

“Son, I want to have a little serious talk with you.”

“Yes, mother.”

“I know you had hoped to go to college next year”—Hoped! He had lived or it. The University of Chicago to study under Moulton, then on to the Yerkes Observatory to work under the eye of Dr. Frost himself—“and I had hoped so, too. But with your father gone, and the girls growing up, it's harder to make ends meet. You've been a good boy, and worked hard to help out. I know you'll understand.”

“Yes, mother.”

“Extra! Extra! Stratosphere Rocket Reaches Paris. Read aaaaalllllll about 't.” The thin little man in the bifocals snatched at the paper and hurried back to the office.

“Look at this, A.J.”

“Huh? Hm-m-m, interesting, but what of it?”

“Can't you see? The next stage is to the Moon!”

“God, but you're a sucker, Delos. The trouble with you is, you read too many of those trashy magazines. Now, I caught my boy reading one of 'em just last week and dressed him down proper. Your folks should have done you the same favor.”

Harriman squared his narrow, middle-aged shoulders. “They will so reach the Moon!”

His partner laughed. “Have it your own way. If baby wants the Moon, papa will bring it home for him. But you stick to your discounts and commissions; that's where the money is.”

The big car droned down the Paseo, and turned off on Armour Boulevard. Old Harriman stirred uneasily in his sleep and muttered to himself.

“BUT, Mr. Harriman—” The young man with the notebook was plainly perturbed. The old man grunted.

“You heard me. Sell 'em. I want every share I own realized in cash as rapidly as possible; Spaceways, Spaceways Provisioning Co., Artemis Mines, Luna City Recreations, the whole lot of them.”

“It will depress the market. You won't realize the full value of your holdings.”

“Don't you think I know that? I can afford it.”

“What about the shares you had earmarked for Tycho Observatory and for the Harriman Scholarships?”

“Oh, yes. Don't sell those. Set up a trust. Should have done it long ago. Tell Mr. Kamens to draw up the papers. He knows what I want.”

The interoffice 'visor flashed into life. "The gentlemen are here, Mr. Harriman."

"Send 'em in. That's all, Ashley. Get busy." Ashley went out as McIntyre and Charlie entered. Harriman got up and trotted forward to greet them.

"Come in, boys, come in. I'm so glad to see you. Sit down. Sit down. Have a cigar."

"Mighty pleased to see you, Mr. Harriman," acknowledged Charlie. "In fact, you might say we need to see you."

"Some trouble, gentlemen?" Harriman glanced from face to face. McIntyre answered him.

"You still mean that about a job for us, Mr. Harriman?"

"Mean it? Certainly. I do. You're not backing out on me?"

"Not at all. We need that job now. You see, the Carefree is lying in the middle of the Osage River, with her jet split clear back to the injector."

"Dear me! You weren't hurt?"

"No, aside from sprains and bruises. We jumped."

Charlie chortled. "I caught a catfish with my bare teeth."

In short order they got down to business. "You two will have to buy a ship for me. I can't do it openly; my colleagues would figure out what I mean to do and stop me. I'll supply you with all the cash you need. You go out and locate some sort of a ship that can be refitted for the trip. Work up some good story about how you are buying it for some playboy as a stratosphere yacht, or that you plan to try to establish an Arctic-Antarctic tourist route. Anything as long as no one suspects that she is being outfitted for space flight.

"Then, after the department of transport licenses her for strato flight, you move to a piece of desert out West—I'll find a likely parcel of land and buy it—and then I'll join you. Then we'll install the extra fuel tanks, change the injectors and timers and so forth, to fit her for the hop. How about it?" McIntyre looked dubious. "It'll take a lot of doing. Charlie, do you think you can accomplish that change-over without a dockyard and shops?"

"Me? Sure, I can—with your thickfingered help. Just give me the tools and materials I want, and don't hurry me too much. Of course, it won't be fancy—"

"Nobody wants it to be fancy. I just want a ship that won't blow when I start slapping the keys."

"It won't blow, Mac."

"That's what you thought about the Carefree."

"That ain't fair, Mac. I ask you, Mr. Harriman—that heap was junk, and we knew it. This'll be different. We're going to spend some dough and do it right. Ain't we, Mr. Harriman?" Harriman patted him on the shoulder. "Certainly we are, Charlie. You can have all the money you want. That's the least of our worries. Now, do the salaries and bonuses I mentioned suit you? I don't want you to be short."

"—as you know, my clients are his nearest relatives and have his interests at heart. We contend that Mr. Harriman's conduct for the past several weeks, as shown by the evidence here adduced, gives clear indication that a mind, once brilliant in the world of finance, has become senile. It is, therefore, with the deepest regret that we pray this honorable court, if it pleases, to declare Mr. Harriman incompetent and to assign a conservator to protect his financial interests and those of his future heirs and assigns." The attorney sat down, pleased with himself.

Mr. Kamens took the floor. "May it please the court—if my esteemed friend is quite through—I suggest that in his last few words my opponent gave away his entire thesis. 'The financial interests of future heirs and assigns.' It is evident

that the petitioners believe that my client should conduct his affairs in such a fashion as to insure that his nieces and nephews, and their issue, will be supported in unearned luxury for the rest of their lives. My client's wife has passed on; he has no children. It is admitted that he has provided generously for his sisters and their children in times past, and that he has established annuities for such near kin as are without means of support.

"But now, like vultures—worse than vultures, for they are not content to let him die in peace—they would prevent my client from enjoying his wealth in whatever manner best suits him for the few remaining years of his life. It is true that he has sold his holdings; is it strange that an elderly man should wish to retire? It is true that he suffered some paper losses in liquidation. 'The value of a thing is what that thing will bring.' He was retiring and demanded cash. Is there anything strange about that?

"It is admitted that he refused to discuss his actions with his so-loving kinfolk. What law, or principle, requires a man to consult with his nephews on anything?

"Therefore, we pray that this court will confirm my client in his right to do what he likes with his own, deny this petition, and send these meddlers about their business."

The judge took off his spectacles and polished them thoughtfully.

"Mr. Kamens, this court has as high a regard for individual liberty as you have, and you may rest assured that any action taken will be solely in the interests of your client. Nevertheless, men do grow old, men do become senile, and in such cases must be protected.

"I shall take this matter under advisement until tomorrow. Court is adjourned."

From the Kansas City Star:

ECCENTRIC MILLIONAIRE DISAPPEARS

—failed to appear for the adjourned hearing. The bailiffs returned from a search of places usually frequented by Harriman with the report that he had not been seen since the previous day. A bench warrant under contempt proceedings has been issued and—

A DESERT sunset is a better stimulant for the appetite than a hot dance orchestra. Charlie testified to this by polishing off the last of the ham gravy with a piece of bread. Harriman handed each of the younger men cigars and took one himself.

"My doctor claims that these weeds are bad for my heart condition," Harriman remarked as he lighted his, "but I've felt so much better since I joined you boys here on the ranch that I am inclined to doubt him." He exhaled a cloud of blue-gray smoke and resumed. "I don't think a man's health depends so much on what he does as on whether he wants to do it. I'm doing what I want to do."

"That's all a man can ask of life," agreed McIntyre.

"How does the work look now, boys?"

"My end's in pretty good shape," Charlie answered. "We finished the second pressure tests on the new tanks and the fuel lines today. The ground tests are all done, except the calibration runs. Those won't take long—just the four hours to make the runs if I don't run into some bugs. How about you, Mac?"

McIntyre ticked them off on his fingers. "Food supplies and water on board. Three vacuum suits, a spare, and service kits. Medical supplies. The buggy already had all the standard equipment for strato flight. The late lunar ephemerides haven't arrived as yet."

"When do you expect them?"

"Any time—they should be here now. Not that it matters. This guff about how hard it is to navigate from here to the Moon is hokum to impress the public. After all, you can see your destination—it's not like ocean navigation. Gimme a sextant and a good stadimeter and I'll set you down any place on the Moon you like—without opening an almanac or a star table—just from a general knowledge of the relative speeds involved."

"Never mind the personal build-up, Columbus," Charlie told him. "Well admit you can hit the floor with your hat. The general idea is, you're ready to go now. Is that right?"

"That's it."

"That being the case, I could run those tests tonight. I'm getting jumpy—things have been going too smoothly. If you'll give me a hand, we ought to be in bed by midnight."

"O.K. When I finish this cigar." They smoked in silence for a while, each thinking about the coming trip and what it meant to him. Old Harriman tried to repress the excitement that possessed him at the prospect of immediate realization of his lifelong dream.

"Mr. Harriman—"

"Eh? What is it, Charlie?"

"How does a guy go about getting rich, like you did?"

"Getting rich? I can't say; I never tried to get rich. I never wanted to be rich, or well known, or anything like that."

"Huh?"

"No, I just wanted to live a long time and see it all happen. I wasn't unusual; there were lots of boys like me—radio hams, they were, and telescope builders, and airplane amateurs. We had science clubs, and basement laboratories, and science-fiction leagues—the kind of boys that thought there was more romance in one issue of the *Electrical Experimenter* than in all the books Dumas ever wrote. We didn't want to be one of Horatio Alger's get-rich heroes, either; we wanted to build spaceships. Well, some of us did."

"Gosh, Pop, you make it sound exciting."

"It was exciting. Charlie. This has been a wonderful, romantic century, for all of its bad points. And it's grown more wonderful and more exciting every year. No, I didn't want to be rich; I just wanted to live long enough to see men rise up to the stars, and, if God was good to me, to go as far as the Moon myself." He carefully deposited an inch of white ash in a saucer. "It has been a good life. I haven't any complaints."

McIntyre pushed back his chair. "Come on, Charlie, if you're ready."

"O.K."

They all got up. Harriman started to speak, then grabbed at his chest, his face a dead gray-white.

"Catch him, Mac!"

"Where's his medicine?"

"In his vest pocket."

They eased him over to a couch, broke a small glass capsule in a handkerchief, and held it under his nose. The volatile released by the capsule seemed to bring a little color into his face. They did what little they could for him, then waited for him to regain consciousness.

Charlie broke the uneasy silence. "Mae, we ain't going through with this."

"Why not?"

"It's murder. He'll never stand up under the initial acceleration."

"Maybe not, but it's what he wants to do. You heard him."

"But we oughtn't to let him."

“Why not? It’s neither your business nor the business of this damn paternalistic government to tell a man not to risk his life doing what he really wants to do.”

“All the same, I don’t feel right about it. He’s such a swell old duck.”

“Then what d’yuh want to do with him—send him back to Kansas City so those old harpies can shut him up in a laughing academy till he-dies of a broken heart?”

“N-no-o-o—not that.”

“Get out there, and make your set-up for those test runs. I’ll be along.”

A WIDE-TIRED desert runabout rolled into the ranch-yard gate the next morning and stopped in front of the house. A heavy-set man with a firm, but kindly, face climbed out and spoke to McIntyre, who approached to meet him.

“You James McIntyre?”

“What about it?”

“I’m the deputy Federal marshal hereabouts. I got a warrant for your arrest.”

“What’s the charge?”

“Conspiracy to violate the Space Precautionary Act.”

Charlie joined the pair. “What’s up, Mac?”

The deputy answered. “You’d be Charles Cummings, I guess. Warrant here for you. Got one for a man named Harriman, too, and a court order to put seals on your spaceship.”

“We’ve no spaceship.”

“What d’yuh keep in that big shed?”

“Strato yacht.”

“So? Well, I’ll put seals on her until a spaceship comes along. Where’s Harriman?”

“Right in there.” Charlie obliged by pointing, ignoring McIntyre’s scowl.

The deputy turned his head. Charlie couldn’t have missed the button by a fraction of an inch, for the deputy collapsed quietly to the ground. Charlie stood over him, rubbing his knuckles and mourning.

“That’s the finger I broke playing shortstop. I’m always hurting that finger.”

“Get Pop into the cabin.” Mac cut him short, “and strap him into his hammock.”

“Aye, aye, skipper.”

They taxied on the auxiliary motor out of the hangar, turned, and started out across the desert plain to find elbow room for the take-off. McIntyre saw the deputy from his starboard conning port. He was staring disconsolately after them.

McIntyre fastened his safety belt, settled his corset, and spoke into the engine-room speaking tube. “All set, Charlie?”

“All set, skipper. But you can’t raise ship yet, Mac. She ain’t named!”

“No time for your superstitions!” Harriman’s thin voice reached them. “Call her the Lunatic. It’s the only appropriate name!”

McIntyre settled his head into the pads, punched two keys, then three more in rapid succession, and the Lunatic raised ground.

“How are you. Pop?”

Charlie searched the old man’s face anxiously. Harriman licked his lips and managed to speak. “Doing fine, son. Couldn’t be better.”

“The acceleration won’t be so bad from here on. I’ll unstrap you so you can wiggle around a little. But I think you’d better stay in the hammock.” He tugged at buckles. Harriman partially repressed a groan.

“What is it. Pop?”

“Nothing. Nothing at all. Just go easy on that side.”

Charlie ran his fingers over the old man’s side with the sure, delicate touch of a mechanic. “You ain’t foolin’ me none, Pop. But there isn’t much I can do until we ground.”

“Charlie—”

“Yes, Pop?”

“Can’t I move to a port? I want to watch the Earth.”

“Ain’t nothin’ to see yet; the blast hides it. As soon as we build up enough speed to coast up to the change-over point, I’ll move you. Tell you what; I’ll give you a sleepy pill, and then wake you when we cut the jets.”

“No!”

“Huh?”

“I’ll stay awake.”

“Just as you say, Pop.”

Charlie fought his way up to the nose of the ship, and braced himself on the gimbals of the pilot’s chair. McIntyre questioned him with his eyes.

“Yeah, he’s alive all right,” Charlie told him, “but he’s in bad shape.”

“How bad?”

“Couple of cracked ribs, anyhow. I don’t know what else. I don’t know whether he’ll last out the trip, Mac. His heart was pounding something awful.”

“He’ll last, Charlie. He’s tough.”

“Tough? He’s delicate as a canary.”

“I don’t mean that. He’s tough way down inside—where it counts.”

“Just the same, you’d letter set her down awful easy if you want to ground with a full complement aboard.”

“I will. I’ll make one full swing around the Moon and ease her in on an involute approach curve. We’ve got enough fuel, I think.”

WHEN they commenced to coast in a free orbit, Charlie unslung the hammock and moved Harriman, hammock and all, to a side port. McIntyre turned the ship about a transverse axis so that the tail pointed toward the Sun, then gave a short blast on two tangential jets opposed in couple to cause the ship to spin slowly about her longitudinal axis, and thereby create a slight artificial gravity. The initial weightlessness when coasting commenced had knotted the old man with the characteristic nausea of free flight, and the pilot wished to save his passenger as much discomfort as possible.

But Harriman was not concerned with the condition of his stomach.

There it was, all as he had imagined it so many times. The Moon swung majestically past the viewport, twice as wide as he had ever seen it before, all of her familiar features cameo-clear. She gave way to the Earth as the ship continued its slow swing, the Earth itself, as he had envisioned her, appearing like a noble moon, eight times as wide as the Moon appears to the Earthbound, arid more luscious, more sensuously beautiful than the silver Moon could be. It was sunset near the Atlantic seaboard—the line of shadow ran down Hudson Bay, slashed through the eastern coast line of North America, touched Cuba, and obscured the eastern bulge of South America. He savored the mellow blue of the Pacific Ocean, felt the texture of the soft green and brown of the continents, admired the blue-white cold of the polar caps. Canada and the great Northwest were obscured by cloud, a vast low-pressure area that spread across the continent. It shone with an even more satisfactory dazzling white than the polar caps.

As the ship swung slowly around, Earth would pass from view, and the stars would march across the port—the same stars he had always known, but steady,

brighter, and unwinking against a screen of perfect, live black. Then the Moon would swim into view again to claim his thoughts.

He was serenely happy in a fashion not given to most men, even in a long lifetime. He felt as if he were every man who had ever lived, and looked up at the stars, and longed.

At least once he must have fallen into deep sleep, or possibly delirium, for he came to with a start, thinking that his wife, Charlotte, was calling to him. "Delos!" the voice had said. "Delos! Come in from there! You'll catch your death of cold in that night air."

Poor Charlotte! She had been a good wife to him, a good wife. He was quite sure that her only regret in dying had been her fear that he would not take proper care of himself. It had not been her fault that she had not shared his dream and his need.

CHARLIE rigged the hammock in such a fashion that Harriman could watch from the starboard port when they swung around the far face of the Moon. He picked out the landmarks made familiar to him by a thousand photographs with nostalgic pleasure, as if he were returning to his own country. McIntyre brought her slowly down as they came back around to the Earthward face, and prepared to land in Mare Imbrium between Aristillus and Archimedes, about ten miles from Luna City.

It was not a bad landing, all things considered. He had to land without coaching from the ground, and he had no second pilot to punch the stadimeter for him. In his anxiety to make it gentle he missed his destination by some thirty miles, but he did his cold-sober best. At that, it was rather bumpy.

As they scooted along to a stop, throwing up powdery pumice on each side, Charlie came up to the control station.

"How's our passenger?" Mac demanded.

"I'll see, but I wouldn't make any bets. That landing stunk, Mac."

"Damn it, I did my best."

"I know you did, skipper. Forget it."

But the passenger was alive and conscious, though bleeding from the nose, and with a pink foam on his lips. He was feebly trying to get himself out of his cocoon. They helped him, working together.

"Where are the vacuum suits?" was his first remark.

"Steady, Mr. Harriman. You can't go out there yet. We've got to give you some first aid."

"Get me that suit! First aid can wait."

Silently they did as he ordered. His left leg was practically useless, and they had to help him through the lock, one on each side. But with his inconsiderable mass having a lunar weight of only twenty pounds, he was no burden. They found a place some fifty yards from the ship where they could prop him up and let him look, a chunk of scoria supporting his head.

McIntyre put his helmet against the old man's and spoke. "We'll leave you here to enjoy the view while we get ready for the trek into town. It's a forty-miler, pretty near, and we'll have to break out spare air bottles and rations and stuff. We'll be back soon."

Harriman nodded without answering, and squeezed their gauntlets with a grip that was surprisingly strong.

He sat very quiet, rubbing his hands against the soil of the Moon and sensing the curiously light pressure of his body against the ground. At long last there was peace in his heart. His hurts had ceased to pain him. He was where he had longed to be—he had followed his need. Overhead hung the Earth in third

quarter, a green-blue giant moon. The Sun's supper limb crowned the crags of Archimedes to his left. And underneath—the Moon; the soil of the Moon itself. He was on the Moon!

He lay back still while a bath of content flowed over him like a tide at flood, and soaked into his very marrow.

His attention strayed momentarily, and he thought once again that his name was called. Silly, he thought; I'm getting old—my mind wanders.

BACK in the cabin Charlie and Mac were rigging shoulder yokes on a stretcher. "There. That will do," Mac commented. "We'd better stir Pop out; we ought to be going."

"I'll get him," Charlie replied. "I'll just pick him up and carry him. He don't weigh nothing."

Charlie was gone longer than McIntyre had expected him to be. He returned alone. Mac waited for him to close the lock and swing back his helmet. "Trouble?"

"Never mind the stretcher, skipper. We won't be needin' it. Yeah, I mean it," he continued. "I did what was necessary."

McIntyre bent down without a word and commenced to strap on the wide skis necessary to negotiate the powdery ash. Charlie followed his example. Then they swung spare air bottles over their shoulders and passed out through the lock.

They didn't bother to close the outer door of the lock behind them. Charlie looked toward the relaxed figure propped up on the bed of Lunar pumice, face fixed toward the Earth. "Well," he grunted, "he hit the Moon—"

MISFIT

"—for the purpose of conserving and improving our interplanetary resources, and providing useful, healthful occupations for the youth of this planet."

(Excerpt from the enabling act, H.R. 7118, setting up the Cosmic Construction Corps.)

"ATTENTION to muster!" The parade ground voice of a first sergeant of Space Marines cut through the fog and drizzle of a nasty New Jersey morning. "As your names are called, answer 'Here,' step forward with your baggage, and embark. Atkins!"

"Here!"

"Austin!"

"Hyar!"

"Ayres!"

"Here!"

One by one they fell out of ranks, shouldered the hundred and thirty pounds of personal possessions allowed them, and trudged up the gangway. They were young—none more than twenty-two—in some cases their luggage outweighed the owner.

"Kaplan!"

"Here!"

"Keith!"

“Heah!”

“Libby!”

“Here!” A thin, gangling, blond lad detached himself from the line, hastily wiped his nose, and grabbed at his belongings. He slung a fat canvas bag over his shoulder, steadied it, and lifted a ponderous composition suitcase with his free hand. He started for the companionway in an unsteady dog trot. As he stepped on the gangway his suitcase swung against his knees. He staggered against a short wary form dressed in the powder-blue service uniform of the Space Navy. Strong fingers grasped his arm and checked his fall.

“Steady, son. Easy does it.” Another hand readjusted the canvas bag.

“Oh, excuse me, uh”—the embarrassed youngster automatically counted the four bands of silver braid below the shooting star—“captain. I didn’t—”

“Bear a hand, and get aboard, son.”

“Yes, sir.”

The passage into the bowels of the transport was gloomy. When the lad’s eyes adjusted he saw a gunner’s mate wearing the brassard of a master-at-arms, who hooked a thumb toward an open bulkhead door.

“In there. Find your locker, and wait by it.”

Libby hurried to obey. Inside he found a jumble of baggage and men in a wide, low-ceilinged compartment. There were no ports, but a line of old-fashioned glow-tubes ran around the junction of bulkhead and ceiling and trisected the overhead, while the soft roar of blowers made a background to the voices of his shipmates. He picked his way through the heaped luggage and located his locker on the far wall outboard. He broke the seal on the combination lock, glanced at the combination, and opened it. The locker was very small, the middle of a tier of three. He considered what he should keep in it.

A loud-speaker drowned out the surrounding voices, and demanded his attention:

“Attention! Man all space details; first section. Raise ship in twelve minifies. Close bulkhead doors. Stop blowers at minus two minutes. Special orders for passengers; place all gear on deck, and lie down on red signal light. Remain down until release is sounded. Masters-at-arms check compliance.”

The gunner’s mate popped in, glanced around and immediately commenced supervising the rearrangement of the baggage. Heavy items were lashed down. Locker doors were closed. By the time each boy had found a place on the deck and the master-at-arms had checked the pad under his head, the glow-tubes turned red and the loudspeaker brayed out:

“All hands! Up ship! Stand by for acceleration.”

The master-at-arms hastily reclined against two cruise bags, and watched the room. The blowers sighed to a stop. There followed two minutes of dead silence—one hundred and twenty seconds.

Libby felt his heart commence to pound as his overexcited adrenal gland poured its drug into his system. It affected his time sense and the two minutes stretched interminably. Then the deck quivered and a roar like escaping high-pressure steam beat at his eardrums. He was suddenly very heavy and a weight lay across his chest and heart.

An indefinite time later the glow-tubes flashed white, and the announcer bellowed:

“Secure all getting underway detail; regular watch, first section.”

The blowers droned into life. The master-at-arms stood up, rubbed his hips, and pounded his arms, then said:

“O.K., boys.” He stepped over and undogged the bulkhead door to the passageway.

Libby got up and blundered into a bulkhead, nearly falling. His arms and legs had gone to sleep, besides which he felt alarmingly light, as if he had sloughed off at least thirty pounds of his inconsiderable mass.

FOR THE next two hours he was too busy to think, or to be homesick. Suitcases, boxes, and bags had to be passed down into the lower hold and lashed against angular acceleration. He found his assigned bunk and learned that it was his only eight hours in twenty-four; two other boys had the use of it, too. Each of the three sections ate in three shifts, nine shifts in all—twenty-four youths and a master-at-arms at one long table which jam-filled a narrow compartment off the galley.

After lunch Libby restowed his locker. He was standing before it, gazing at a photograph which he intended to mount on the inside of the locker door, when a sharp command filled the compartment.

“Attention!”

Standing inside the door was the captain flanked by the master-at-arms. He commenced to speak. “At rest, men. Sit down. McCoy, tell control to shift this compartment to smoke filter.”

The gunner’s mate hurried to the communicator on the bulkhead and spoke into it in a low tone. Almost at once the hum of the blowers changed in pitch—climbed a half-octave and stayed there.

“Now light up if you like,” said the captain. “I’m going to talk to you.

“You boys are headed out on the biggest thing so far in your lives. From now on you’re men, with one of the hardest jobs ahead of you that men have ever tackled. What we have to do is part of a bigger scheme. You, and hundreds of thousands of others like you, are being sent out as pioneers to fix up the solar system so that human beings can make better use of it.

“Besides that, and equally important, you are being given a chance to build yourselves into useful and happy citizens of the Federation. For one reason or another every one of you weren’t happily adjusted back on Earth. Some of you saw the jobs you were trained for abolished by new inventions. Some of you got into trouble from not knowing what to do with the modern leisure. Maybe you were called bad boys and had a lot of black marks chalked up against you.

“Everyone of you starts even today. The only record you have in this ship is your name at the top of a blank sheet of paper. It’s up to you what goes on that page.

“Now about our job: We didn’t get one of the easy repair-and-recondition jobs on the Moon, with week ends at Luna City, and all the comforts of home. Nor did we draw a high gravity planet where a man can eat a full meal and expect to keep it down. Instead, we’ve got to go out to Asteroid HS 5388 and turn it into Space Station E-M 3. She has no atmosphere at all, and only about two percent Earth surface gravity. We’ve got to play human fly on her for at least six months, no girls to date, no television, no recreation that you don’t devise yourselves, and hard work every day. You’ll get spacesick, and so homesick you can taste it, and agarophobia. If you aren’t careful you’ll get rayburnt. Your stomach will act up, and you’ll wish to God you’d never enrolled.

“But if you behave yourself, and listen to the advice of the old spacemen, you’ll come out of it strong and healthy, with a little credit stored up in the bank, and a lot of knowledge and experience that you wouldn’t get in forty years on Earth. You’ll be men, and you’ll know it.”

“One last word. It will take us eleven days to make the crossing. It will be pretty uncomfortable to those that aren’t used to it. Just give the other fellow a little consideration, and you’ll get along all right. If you have any complaint and

can't get satisfaction any other way, come see me. Otherwise, that's all. Any questions?"

One of the hoys put up his hand. "Captain?" he inquired timidly.

"Speak up, lad, and give your name."

"Rogers, sir. Will we be able to get letters from home?"

"Yes, but not very often. Maybe every month or so. The chaplain will carry mail, and any inspection and supply ships."

THE TRIP rapidly became monotonous. After the first thrill of being in space, and of watching the Earth and her moon recede from the view-port in the lower hold, there was not much to do but to kill time. Acey-deucey, other games, and bull sessions only partially filled the time. The master-at-arms found chores enough to occupy a few hours each day; the men polished bright-work, policed the quarters, cleaned their mess billets. But there was little that could be done, and Libby had plenty of time to be miserably homesick.

One day the ship's loud-speaker blatted out: "All hands! Free flight in ten minutes. Stand by to lose weight."

The master-at-arms supervised the rigging of grab-lines. All loose gear was made fast, and little cellulose bags were issued to each man.

Hardly was this done when Libby felt himself get light on his feet—a sensation exactly like that experienced when an express elevator makes a quick stop on an upward trip, except that the sensation continued and became more intense. At first it was a pleasant novelty, then it rapidly became distressing. The blood pounded in his ears, and his feet were clammy and cold. His saliva secreted at an abnormal rate. He tried to swallow, choked, and coughed. Then his stomach shuddered and contracted with a violent, painful, convulsive reflex, and he was suddenly, disastrously nauseated.

After the first excruciating spasm, he heard McCoy's voice shouting:

"Hey! Use your sick-kits like I told you. Don't let that stuff get in the blowers."

Dimly Libby realized that the admonishment included him. He fumbled for his cellulose bag just as a second temblor shook him, but he managed to get the bag over his mouth and nose before the eruption occurred. When it subsided, more or less, he became aware that he was floating near the overhead and facing the door.

The chief master-at-arms slithered in the door and spoke to McCoy. "How are you making out?"

"Well enough. Some of the boys missed their kits."

"O.K. Mop it up. You can use the starboard lock." He swam out.

McCoy touched Libby's arm. "Here, Pinkie, start catching them butterflies."

The gunner's mate handed him a handful of cotton waste, then took another handful himself and neatly dabbed up a globule that floated about the compartment. "Be sure your sick-kit is on tight, Pinkie. When you get sick, just stop and wait until it's over."

Libby imitated him as best he could. In a few minutes the room was free of the worst of the debris.

McCoy looked it over, and spoke, "Now peel off them dirty duds, and change your kits. Three or four of you bring everything along to the starboard lock."

At the starboard spacelock, the kits were put in first, the inner door closed, and the outer opened. When the inner door was opened the kits were gone—blown out into space by the escaping air.

Pinkie addressed McCoy, "Do we have to throw away our dirty clothes, too?"

"Huh uh. We'll just give them a close of vacuum. Take 'em into the lock and stop 'em to those hooks on the bulkheads. Tie 'em tight."

This time the lock was left closed for about five minutes. When the lock was opened the garments were bone dry—all the moisture boiled out by the vacuum of space. All that remained was a sterile powdery residue.

McCoy viewed them with approval. “They’ll do. Take them back to the compartment. Then brush them—hard—in front of the exhaust blowers.”

THE NEXT few days were an eternity of misery. Homesickness was forgotten in the all-engrossing wretchedness of spacesickness. The captain granted fifteen minutes of mild acceleration for each of the nine meal periods, but the respite accentuated the agony. Libby would go to a meal, weak, and ravenously hungry. The meal would stay down until free flight was resumed, then the sickness would hit him all over again.

On the fourth day he was seated against a bulkhead, enjoying the luxury of a few remaining minutes of weight while the last shift ate, when McCoy walked in and sat down beside him. The gunner’s mate lit a cigarette. He inhaled deeply and started to chat.

“How’s it going, bud?”

“All right, I guess. This spacesickness—Say, McCoy, how do you ever get used to it?”

“You get over it in time. Your body acquires some new reflexes, so they tell me. Once you learn to swallow without choking, you’ll be all right. You even get so you like it. It’s restful and relaxing. Four hours’ sleep is as good as ten.”

Libby shook his head dolefully. “I don’t think I’ll ever get used to it.”

“Yes, you will. You’d better, anyway. This here asteroid won’t have any surface gravity to speak of; the chief quartermaster says it won’t run over two percent Earth normal. That ain’t enough to cure spacesickness. And there won’t be any way to accelerate for meals, either.”

Libby shivered and held his head between his hands.

LOCATING one asteroid among a couple of thousand is not as easy as finding Trafalgar Square in London—especially against the star-crowded backdrop of the Galaxy. You take off from terra with its orbital speed of about nineteen miles per second. Then you attempt to plot a composite conoid curve that will not only intersect the orbit of the tiny fast-moving body, but accomplish an exact rendezvous. And be careful not to approach it too rapidly, or you may exceed the critical speed, beyond which the potential energy of your fuel is not sufficient to drive its mass equivalent back into the comfortable clutch of Sol’s gravitational field. On and on you drop until madness or starvation or suffocation does for you.

Asteroid HS 5388—“Eighty-eight”—lay about two and two tenths astronomical units out from the Sun, a little more than two hundred million miles. In consequence it had an orbital speed of not quite thirteen miles per second. When the transport took off Eighty-eight lay beyond the Sun better than three hundred million miles away. Captain Doyle instructed the navigator to plot the basic paraboloid to tack in free flight around the Sun through an elapsed distance of some three hundred and forty million miles. They arched high over the plane of the ecliptic in order to avoid the major portion of the cosmic refuse that cluttered up the asteroid belt.

The principle involved is simple, and is identically the same principle used by a hunter to wing a duck in flight by “leading” with his gunsights to allow for the motion of the bird. But suppose that you face directly into the Sun as you

shoot; suppose the bird cannot be seen from where you stand, and you have nothing to aim by but some old reports as to how it was flying when last seen?

On the ninth day of the passage Captain Doyle betook himself to the chart-room and commenced punching keys on the ponderous integral calculator. Then he sent his orderly to present his compliments to the navigator and to ask him to come to the chartroom. A few minutes later a tall heavy-set form swam through the door, steadied himself with a grab-line, and greeted the captain.

“Good morning, skipper.”

“Hello, Blackie.” The Old Man looked up from where he was strapped in the integrator’s saddle. “I’ve been checking your corrections for the mealtime accelerations.”

“It’s a nuisance to have a bunch of ground-lubbers on board, sir.”

“Yes, it is, but we have to give those boys a chance to eat, or they couldn’t work when we get there. Now I want to decelerate, starting about ten o’clock ship’s time. What’s our eight o’clock speed and co-ordinates?”

The navigator slipped a notebook out of his tunic. “Three hundred fifty-eight miles per second; course is right ascension fifteen hours, eight minutes, twenty-seven seconds; declination minus seven degrees, three minutes; solar distance one hundred and ninety-two million four hundred eighty thousand miles. Our radial position is nearly twelve degrees above course, and almost dead on course in R. A. Do you want Sol’s co-ordinates?”

“No, not now.” The captain bent over the calculator, frowned and chewed the tip of his tongue as he worked the controls. “I want you to kill the acceleration about one million miles inside Eighty-eight’s orbit. I hate to waste the fuel, but the belt is full of junk and this damned rock is so small that we will probably have to run a search curve. Use twenty hours on deceleration and commence changing course to port after eight hours. Use normal asymptotic approach. You should have her paralleling her orbit by six o’clock tomorrow morning. I shall want to be called at three.”

“Aye, aye, sir.”

“Let me see your figures when you get ’em. I’ll send up the order book later.”

SHORTLY after three the captain entered the control room and blinked his eyes at the darkness. The Sun was still concealed by the hull of the transport and the midnight blackness was broken only by the dim blue glow of the instrument dials, and the crack of light from under the chart hood. The navigator turned at the familiar tread. “Good morning, captain.”

“Morning, Blackie. In sight yet?”

“Not yet. We’ve picked out half a dozen rocks, but none of them checked.”

“Any of them close?”

“Not uncomfortable. We’ve overtaken a little sand from time to time.”

“That can’t hurt us—not on a stern chase like this. If pilots would only realize that the asteroids flow in fixed directions at computable speeds nobody would come to grief out here. But no—these sporting pilots have to show off and drive straight through at right angles. No wonder they get their hulls pierced.”

He stopped to light a cigarette. “People talk about space being dangerous. Sure, it used to be; but I don’t know of a case in the past twenty years that couldn’t be charged up to some fool’s recklessness.”

“You’re right, skipper. By the way, there’s coffee under the chart hood.”

“Thanks. I had a cup down below.” He walked over by the lookouts at the stereoscopes and peered out at the star-flecked blackness.

Three cigarettes later, the lookout nearest him called out:

“Light ho!”

“Where away?” asked the captain.

His mate read the exterior dials of the stereoscope. “Plus point two, abaft one point three; slight drift astern.”

“Does that check?”

“Could be, captain. What is her disk?” came the navigator’s muffled voice from under the hood. The lookout hurriedly twisted the knobs of his instrument, but the captain nudged him aside.

“I’ll do this, son.” He fitted his face to the double eye guards and surveyed a little silvery sphere, a tiny moon. Carefully he brought two illuminated crosshairs in until they were exactly tangent to the upper and lower limbs of the disk. “Mark!”

The reading was noted and passed to the navigator, who shortly ducked out from under the hood.

“That’s our baby, captain.”

“Good.”

“Shall I make a triangulation?”

“Let the watch officer, do that. You go down and get some sleep. I’ll ease her over until we get close enough to use the range finder.”

“Thanks, I will.”

WITHIN a few minutes the word had spread around the ship that Eighty-eight had been sighted. Libby crowded into the starboard hold with a throng of excited messmates and attempted to make out their future home from the viewport. McCoy poured cold water on their excitement.

“By the time that rock shows up big enough to tell anything about it with your naked eye, we’ll all be at our grounding stations. She’s only about a hundred miles thick, yuh know.”

And so it was. Many hours later the ship’s announcer shouted, “All hands! Man your grounding stations. Close all bulkhead doors. Stand by to cut blowers on signal.”

McCoy forced them to lie down throughout the ensuing two hours.

Short sharp shocks of the rocket blasts alternated with nauseating weightlessness. Then the blowers stopped and their check valves clicked into their seats. The ship dropped free for a few moments—a final quick blast—five seconds of falling, and a short, light, grinding bump. A single bugle note came over the announcer, and the blowers took up their hum.

McCoy floated lightly to his feet and poised, swaying, on his toes. “All out, troops—this is the end of the line.”

A short chunky lad, a little younger than most of them, awkwardly emulated him, and bounded toward the door, shouting as he went, “Come on, fellows! Let’s go outside and explore!”

The master-at-arms quickly squelched such thoughtless enthusiasm. “Not so fast, kid. Aside from the fact that there is no air out there, go right ahead. You’ll freeze to death, burn to death, and explode like a ripe tomato. Squad leader, detail six men to break out space-suits. The rest of you stay here and stand by.”

The working party returned shortly loaded down with a couple of dozen bulky packages. Libby let go the four he carried and watched them float gently to the deck. McCoy unzipped the envelope from one suit, and lectured them about it.

“This is a standard service type, general issue, Mark I V, Modification 2.” He grasped the suit by the shoulders, and shook it out so that it hung like a suit of long winter underwear with the helmet lolling helplessly between the shoulders of the garment. “It’s self-sustaining for eight hours, having oxygen supply for

that period. It also has a nitrogen trim tank and a carbon-dioxide-water-vapor cartridge filter.”

He droned on, repeating practically verbatim the description and instructions given in training regulations. McCoy knew these suits like his tongue knew the roof of his mouth, and the knowledge had meant his life on more than one occasion.

“The suit is woven from fine steel wire, and sprayed with non-volatile asbestocellutite. The resulting fabric is flexible, very durable; and will turn all rays normal to solar space outside the orbit of Mercury. It is worn almost skintight, but notice the wire-braced accordion pleats at the major joints. They are so designed as to keep the internal volume of the suit nearly constant when the arms or legs are bent. Otherwise, the gas pressure inside would tend to keep the suit blown up in an erect position, and movement while wearing the suit would be very fatiguing.

“The helmet is molded from transparent duralite, leaded and polarized against too great ray penetration. It may be equipped with external visors of any needed type. Orders are to wear not less than a Number Two amber on this body. In addition a lead plate covers the cranium and extends on down the back of the suit, completely covering the spinal column.

“The suit is equipped with two-way telephony of a half mile radius. If your radio quits, as these have a habit of doing, you can talk by putting your helmets in contact. Any questions?”

“How do you eat and drink during the eight hours?” one of the men asked.

“You don’t stay in ’em any eight hours. You can carry sugar halls in a gadget in the helmet, hut you boys will always eat at the base. As for water, there’s a nipple in the helmet near your mouth which you can reach by turning your head to the left. It’s hooked to a built-in canteen.”

SUITS were passed out to each lad, and McCoy illustrated how to don one. A suit was spread supine on the deck, the front zipper that stretched from neck to crouch was spread wide and one sat down inside this opening, whereupon the lower part was drawn on like long-stockings. Then a wiggle into each sleeve and the heavy flexible gauntlets were smoothed and patted into place. Finally an awkward backward stretch of the neck, with shoulders-hunched, enabled the helmet to be placed over the head.

Libby followed the motions of McCoy and stood up in his suit. He examined the zipper which controlled the suit’s only opening. It was backed by two soft gaskets which would be pressed together by the zipper and further sealed by internal air pressure. Inside the helmet a composition mouthpiece for exhalation led to the filter.

McCoy bustled around, inspecting them, tightening a belt here and there, instructing them in the use of the external controls. Satisfied, he reported to the conning room that his section had received basic instruction and was ready to disembark. Permission was received to take them out for thirty minutes acclimation.

Six at a time he escorted them through the air lock, and out onto the surface of the planetoid. Libby blinked his eyes at the unaccustomed luster of sunshine on rock. Although the Sun lay more than two hundred million miles away and bathed the little planet with radiation only one fifth as strong as that lavished on mother Earth, nevertheless, the lack of atmosphere resulted in a glare that made him squint. He was glad to have the protection of his amber visor. Overhead the Sun, shrunk to penny size, shone down from a dead black sky in which unwinking stars crowded each other and the very Sun itself.

The voice of one of his messmates sounded in his earphones, "Jeepers! That horizon looks close. I'll bet it ain't more'n a mile away."

Libby looked over the flat hare plain and subconsciously considered the matter. "It's less," he commented, "than a third of a mile away."

Jeering tones answered him. "What do you know about it, Pinkie? And who asked you, anyway?"

Libby answered defensively, "As a matter of fact, it's one thousand six hundred and seventy feet, figuring that my eyes are five feet three inches above ground level."

"Nuts. Pinkie, you're always trying to show off how much you know."

"Why, I am not," Libby protested. "If this body is a hundred miles thick, and as round as it looks; why, naturally the horizon has to be just that far away."

The answer was scoffing, contemptuous.

McCoy cut him short. "Pipe down! The kid's a lot nearer right than you are."

"As a matter of fact, he is exactly right," put in a strange voice. "I had to look it up for the navigator before I left control."

"Is that so?"—McCoy's voice again—"If the chief quartermaster says you're right, Libby, you're right. McCoy did you know?"

Libby flushed miserably. "I . . . I don't know. That's the only way it could be."

The gunner's mate and the quartermaster looked at him for a moment, but dropped the subject.

BY THE END of the "day"—ship's time; Eighty-eight—had a period of eight hours and thirteen minutes—work was well underway. The transport had grounded immediately adjacent to a low range of hills that arose sharply from the plain. The captain selected a little bowl-shaped depression in the hills, some thousand feet long and half as broad in which to establish a permanent camp. This was to be roofed over, sealed, and an atmosphere provided.

In the hill between the ship and the valley, quarters were to be excavated; dormitories, mess hall, officers' quarters, sick bay, recreation room, officers' storerooms, and so forth. A tunnel must be bored through the hill, connecting the sides of these rooms, and connecting with a ten-foot airtight metal tube sealed to the ship's portside air lock. Both the tube and tunnel were to be equipped with a continuous conveyor belt for passengers and freight.

Libby found himself assigned to the roofing detail. He helped the metal-smith's mate struggle over the hill with a portable atomic heater, difficult to handle because of a mass of eight hundred pounds, but weighing only sixteen pounds. The rest of the roofing detail were breaking out and preparing to move by hand the enormous translucent tent which was to be the "sky" of the little valley.

The metalsmith located a landmark on the inner slope of the valley, set up his heater, and commenced cutting a deep horizontal groove or step in the rock. He kept it always at the same level by following a chalk mark drawn along the rock wall. Libby inquired how the job had been surveyed so quickly.

"Easy," he was answered, "two of the quartermasters went ahead with a transit, leveled it just fifty feet above the valley floor, and clamped a searchlight to it. Then one of 'em ran like hell around the rim, making chalk marks at the height at which the beam struck."

"Is this roof going to be just fifty feet high?" asked Libby.

"No, it will average maybe a hundred. It bellies up in the middle from the air pressure."

"Earth normal?" persisted Libby.

"Yeah."

Libby concentrated for an instant, then looked puzzled.

"But look—this valley is a thousand feet long and better than five hundred wide. At fifteen pounds per square inch, and allowing for the arch of the roof, that's a load of two and a quarter billion pounds. What fabric can take that kind of a load?"

"Cobwebs."

"Cobwebs?" echoed Libby.

"Yeah, cobwebs. Strongest stuff in the world, stronger than the best steel. Synthetic spider silk. This gauge we're using for the roof has a tensile strength of four thousand pounds a running inch." Libby hesitated a second, then replied, "I see. With a rim about eighteen hundred thousand inches around, the maximum pull at the point of anchoring would be about twelve hundred and fifty pounds per inch. Plenty safe margin." The metalsmith leaned on his tool and nodded. "Something like that. You're pretty quick at arithmetic, aren't you, bud?"

Libby looked startled. "Am I? I just like to get things straight."

They worked rapidly around the slope, cutting a clean smooth groove to which the "cobweb" could be anchored and sealed. The white-hot lava spewed out of the discharge vent and ran slowly down the hillside. A brown vapor boiled off the surface of the molten rock, arose a few feet and sublimed almost at once to a white powder which settled to the ground. The metalsmith pointed to the powder.

"That stuff 'u'd cause silicosis if we let it stay there, and breathed it later."

"What do you do about it?" asked Libby.

"Just clean it out with the blowers of the air conditioning plant."

Libby took this opening to ask another question. "Mister—"

"Johnson's my name. No 'Mister' necessary."

"Well, Johnson, where do we get the air for this whole valley, not to mention the tunnels? I figure we must need fifty million cubic feet or more. Do we manufacture it?"

"Naw, that's too much trouble. We brought it with us."

"On the transport?" Libby wanted to know.

"Uh huh, at a hundred atmospheres—fifteen hundred pounds pressure," said Johnson.

Libby considered this. "I see—that way it would go into a space eighty feet on a side."

"Matter of fact, it's in three specially constructed holds—giant air bottles. This transport carried air to Luna City. I was in her then—a recruit, but in the air gang, even then."

IN THREE WEEKS the permanent camp was entirely ready for occupancy, and the transport entirely cleared of its cargo. The storerooms bulged with tools and supplies. Captain Doyle had moved his administrative offices underground, signed over his command to his first officer, and given him permission to "proceed on duty assigned," in this case, to return to terra with a skeleton crew.

Libby watched them take off from a vantage point on the hillside. An overpowering homesickness took possession of him. Would he ever go back? Would he ever see the Sun rise on the Ozark hills again? He honestly believed at the time that he would swap the rest of his life for thirty minutes with his mother.

He started back down the hill toward the tunnel lock. At least the transport carried letters to her, and with any luck the chaplain would be by soon with letters from Earth. He had enjoyed being in the air gang, but tomorrow he went

back to his squad. He did not like that much. The boys were all right, he guessed, but he just could not seem to fit in.

Next day this company of the C.C.C. started on its bigger job; to pockmark Eighty-eight with rocket tubes so that Captain Doyle could push this hundred mile marble out of her orbit and herd her into a new orbit between Earth and Mars, to be used as a space station—a refuge for ships in distress, a haven for lifeboats, a fueling stop, a naval outpost.

Libby was assigned to a heater in pit h-16. It was his business to carve out carefully calculated emplacements in which the blasting crew set off the minute charges which accomplished the major part of the excavating. Two squads were assigned to h-16, under the general supervision of an elderly marine gunner. Libby was free of the immediate supervision of his squad leader, who had been promoted to technical assistant on the strength of a few months' training in an engineering school. The Marine gunner sat on the edge of the pit, handling the plans, and occasionally making necessary calculations on the circular slide rule which hung from a lanyard around his neck.

Libby had just completed a tricky piece of cutting for a three-stage blast, and was waiting for the blasters, when his phones picked up the gunner's instructions concerning the size of the charge. He pressed his transmitter button.

"Mr. Larsen! You've made a mistake!"

"Who said that?"

"This is Libby. You've made a mistake in the charge. If you set off that charge, you'll blow this pit right out of the ground, and us with it."

Marine Gunner Larsen spun the dials on his slide rule before replying, "You're all het up over nothing, son. That charge is correct."

"No, I'm not, sir," Libby persisted, "you've multiplied where you should have divided."

"Have you had any experience at this sort of work?" Johnson queried.

"No, sir."

Larsen addressed his next remark to the blasters. "Set the charge."

They started to comply. Libby gulped, and wiped his lips with his tongue. He knew what he had to do, but he was afraid. Two clumsy stifflegged jumps placed him beside the blasters. He pushed between them and tore the electrodes from the detonator.

A shadow passed over him as he worked, and Larsen floated down beside him. A hand grasped his arm.

"You shouldn't have done that, son. That's direct disobedience of orders. I'll have to report you." He commenced reconnecting the firing circuit.

Libby's ears burned with embarrassment, but he answered back with the courage of timidity at bay. "I had to do it, sir. You're still wrong."

Larsen paused and ran his eyes over the dogged face. "Well—it's a waste of time, but I don't like to make you stand by a charge you're afraid of. Let's go over the calculation together."

CAPTAIN DOYLE sat at his ease in his quarters, his feet on his desk. He stared at a nearly empty glass tumbler.

"That's good beer, Blackie. Do you suppose we could brew some more when it's gone?"

"I don't know, cap'n. Did we bring any yeast?"

"I'll ask the steward later." He turned to the massive man who occupied the third chair. "Well, Larsen, I'm glad it wasn't any worse than it was."

“What beats me, captain, is how I could have made such a mistake. I worked it through twice. If it had been a nitro explosive, I’d have known offhand that I was wrong. If this kid hadn’t had a hunch, I’d have set it off.”

Captain Doyle clapped the old warrant officer on the shoulder. “Forget it, Larsen. You wouldn’t have hurt anybody; that’s why I require the pits to be evacuated even for small charges. These micro-explosives are tricky at the best. Look what happened in pit a-9. Ten days’ work shot with one charge, and the gunnery officer himself approved that one. But I want to see this boy. What did you say his name was?”

“Libby, A.J.”

Doyle touched a button on his desk. A knock sounded at the door. A bellowed “Come in!” produced a stripling wearing the brassard of corpsman man-of-the-deck.

“Have Corpsman Libby report to me.”

“Aye, aye, sir.”

SOME FEW minutes later Libby was ushered into the sanctum sanctorum. He looked nervously around, and noted Larsen’s presence, a fact that did not contribute to his peace of mind. He reported in a barely audible voice, “Corpsman Libby, sir.”

The captain looked him over. “Well, Libby, I hear that you and Mr. Larsen had a difference of opinion this morning. Tell me about it.”

“I . . . I didn’t mean any harm, sir.”

“Of course not. You’re not in any trouble. Tell me, how did you know that the calculation was wrong? Had any mining experience?”

“No, sir. I just saw that he had worked it out wrong.”

“But how?” Captain Doyle asked. Libby shuffled uneasily. “Well, sir, it just seemed wrong—it didn’t fit.”

“Just a second, captain. I have a hunch you’ve got a—May I ask this young man a couple of questions?” It was Commander “Blackie” Rhodes who spoke.

“Certainly. Go ahead.”

“Are you the lad they call ‘Pinkie’?” asked Rhodes.

Libby blushed. “Yes, sir.”

“I’ve heard some rumors about this boy.” Rhodes pushed his big frame out of his chair, went over to a bookshelf, and removed a thick volume. He thumbed through it, then with open book before him, started to question the youth.

“What’s the square root of ninety-five?”

“Nine, and seven hundred forty-seven thousandths.”

“What’s the cube root?”

“Four, and five hundred sixty-three thousandths.”

“What’s its logarithm?”

“It’s what, sir?”

“Good lord, can a boy get through school today without knowing?”

THE BOY’S discomfort, became more intense. “I didn’t get much schooling, sir. My folks didn’t accept the Covenant until pappy died, and we had to.”

“I see. A logarithm is a name for a power to which you raise a given number, called the base, to get the number whose logarithm it is. Is that clear?”

Libby thought hard. “I don’t quite get it, sir.”

“I’ll try again. If you raise ten to the second power—square it—it gives one hundred. Therefore the logarithm of one hundred to the base ten is two. In the

same fashion the logarithm of a thousand to the base ten is three. Now what is the logarithm of ninety-five?"

Libby puzzled for a moment. "I can't make it come out even. It's a fraction."

"That's O.K.," said Rhodes.

"Then it's one, and nine hundred seventy-eight thousandths—just about."

Rhodes turned to the captain. "I guess that about proves it, sir."

Doyle nodded. "Yes, the lad undoubtedly has an intuitive knowledge of all arithmetical relationships. But let's see what else he has."

"I'm afraid we'll have to send him back to Earth to find out properly." Rhodes spoke directly to the captain.

Libby caught the gist of this last remark. "Please, sir, you aren't going to send me home? Maw 'u'd be awful vexed with me."

"No, no, nothing of the sort," said the captain. "When your time is up, I want you to be checked over in the psychometrical laboratories. In the meantime, I wouldn't part with you for a quarter's pay. I'd give up smoking first. But let's see what else you can do."

In the ensuing hour the captain and the navigator heard Libby: one, deduce the Pythagorean proposition; two, derive Newton's laws of motion and Kepler's laws of ballistics from a statement of the conditions in which they obtained; three, judge length, volumes and masses by eye, with no measurable error. He had jumped into the idea of relativity and non-rectilinear space-time continua, and was beginning to pour forth ideas faster than he could talk, when Doyle held up a hand.

"That's enough, son. You'll be getting a fever. You run along to bed now, and come see me in the morning. I'm taking you off field work."

"Yes, sir," answered Libby.

"By the way, what is your full name?"

"Andrew Jackson Libby, sir."

"No, your folks wouldn't have signed the Covenant. Good night."

"Good night, sir."

After he had gone, the two older men discussed their discovery.

"How do you size it up, captain?"

"Well, he's a genius, of course—one of those wild talents that will show up once in a blue moon," said Doyle. "I'll turn him loose among my books and see how he shapes up. Shouldn't wonder if he were a page-at-a-glance reader, too."

"It beats me what we turn up among these boys—and not a one of 'em any account back on Earth."

Doyle nodded. "That was the trouble with these kids. They didn't feel needed."

EIGHTY-EIGHT swung some millions of miles farther around the Sun. The pockmarks on her face grew deeper, and were lined with durite, that strange close-packed laboratory product which—usually—would confine even atomic disintegration. Then Eighty-eight received a series of gentle pats, always on the side farthest from the Sun. In a few weeks' time the rocket blasts had their effect and Eighty-eight was plunging in a hyperbolic orbit toward the Sun.

When she reached her station, one and three-tenths the distance from the Sun of Earth's orbit, she would have to be coaxed by another series of pats into a circular orbit. Thereafter she was to be known as E-M 3, Earth-Mars Space Station Spot Three.

Hundreds of millions of miles away two other C.C.C. companies were inducing two other planetoids to quit their age-old grooves and slide between Earth and Mars to land in the same orbit as Eighty-eight. One was due to ride

this orbit one hundred and twenty degrees ahead of Eighty-eight, the other one hundred and twenty degrees behind. When E-M 1, E-M 2, and E-M 3 were all on station no hard-pushed traveler of the spaceways on the Earth-Mars passage would ever again find himself far from land—or rescue.

During the months that Eighty-eight fell free toward the Sun, Captain Doyle reduced the working hours of his crew and turned them to the comparatively light labor of building a hotel and converting the little roofed-in valley into a garden spot. The rock was broken down into soil, fertilizers applied, and cultures of anerobic bacteria planted. Then plants, conditioned by thirty-odd generations of low gravity at Luna City, were set out and tenderly cared for. Except for the low gravity, Eighty-eight began to feel like home.

But when Eighty-eight approached a tangent to the hypothetical future orbit of E-M 3, the company went back to maneuvering routine, watch on and watch off, with the captain living on black coffee and catching catnaps in the plotting room.

Libby was assigned to the ballistic calculator, three Earth-tons of thinking metal that dominated the plotting room. He loved the big machine with its integrators, three-dimensional cams, its differential gear trains, and silent gyroscopes. The chief fire controlman let him help adjust it, and care for it.

Libby subconsciously thought of it as a person—his own kind of a person.

On the last day of the approach, the shocks were more frequent. Libby sat in the right hand saddle of the calculator, and droned out the predictions for the next salvo, while gloating over the accuracy with which the machine tracked. Captain Doyle fussed around nervously, occasionally stopping to peer over the navigator's shoulder. Of course, the figures were right, but what if it didn't work? No one had ever moved so large a mass before. Suppose it plunged on and on—and on. Nonsense! It couldn't. Still he would be glad when they were past the critical speed.

A marine orderly touched his elbow. "Helio from the Flagship, sir."

"Read it."

"Flag to Eighty-eight; private message, Captain Doyle: Am lying off to watch you bring her in—Kearney."

Doyle smiled. Nice of the old geezer. Once they were on station, he would invite the admiral to ground for dinner and show him the park.

Another salvo cut loose, heavier than before. The room trembled violently. In a moment the reports of the surface observers commenced to trickle in. "Tube nine, clear!"

"Tube ten, clear!"

But Libby's drone ceased.

Captain Doyle turned on him. "What's the matter, Libby? Asleep? Call the polar stations. I've got to have a parallax."

"Captain—" the boy's voice was low and shaking.

"Speak up, man!"

"Captain—the machine isn't tracking."

"Spies!" The grizzled head of the chief fire controlman appeared from behind the calculator.

"I'm already on it, sir. Let you know in a moment."

He ducked back again. After a couple of long minutes he reappeared. "Gyros tumbled. It's a twelve-hour calibration job. at least."

The captain said nothing, but turned away, and walked to the far end of the room. The navigator followed him with his eyes. He returned, glanced at the chronometer, and spoke to the navigator.

"Well, Blackie, if I don't have that firing data in seven minutes, we're sunk. Any suggestions?"

Rhodes shook his head without speaking.
Libby timidly raised his voice. "Captain—"
Doyle jerked around, "Yes?"
"The firing data is tube thirteen, seven point six three; tube twelve, six point nine oh; tube fourteen, six point eight nine."
Doyle studied his face. "You sure about that, son?"
"It *has* to be that, captain."
Doyle stood perfectly still. This time he did not look at Rhodes but stared straight ahead. Then he took a long pull on his cigarette, glanced at the ash, and said in a steady voice, "Apply the data. Fire on the bell."

FOUR HOURS later Libby was still droning out firing data, his face gray, his eyes closed. Once he had fainted but when they revived him he was still muttering figures. From time to time, the captain and the navigator relieved each other, but there was no relief for him.

The salvos grew closer together, but the shocks were lighter.

Following one faint salvo, Libby looked up, stared at the ceiling, and spoke, "That's all, captain."

"Call polar stations!"

The reports came back promptly, "Parallax constant, sidereal-solar rate constant."

The captain relaxed into a chair. "Well, Blackie, we did it—thanks to Libby!" Then he noticed a worried, thoughtful look spread over Libby's face. "What's the matter, man? Have we slipped up?"

"Captain, you know you said the other day that you wished you had Earth normal gravity in the park?"

"Yes. What of it?"

"If that book on gravitation you lent me is straight dope, I think I know a way to accomplish it," said Libby.

The captain inspected him as if seeing him for the first time. "Libby, you have ceased to amaze me. Could you stop doing that sort of thing long enough to dine with the admiral?"

"Gee, captain, that would be swell!" The audio circuit from Communications cut in, "Helio from Flagship: 'Well done, Eighty-eight.'"

Doyle smiled around at them all. "That's pleasant confirmation."

The audio brayed again, "Helio from Flagship: 'Cancel last signal, stand by for correction.'"

A look of surprise and apprehension sprang into Doyle's face before self-discipline could prevent it.

The audio continued, "Helio from Flagship: 'Well done, E-M 3.'"

THE ROADS MUST ROLL

"WHO makes the roads roll?"

The speaker stood still on the rostrum and waited for his audience to answer him. The reply came in scattered shouts that cut through the ominous, discontented murmur of the crowd.

"We do! We do! Damn right!"

“Who does the dirty work ‘down inside’—so that Joe Public can ride at his ease?”

This time it was a single roar: “We do!”

The speaker pressed his advantage, his words tumbling out in a rasping torrent. He leaned toward the crowd, his eyes picking out individuals at whom to fling his words. “What makes business? The roads! How do they move the food they eat? The roads! How do they get to work? The roads! How do they get home to their wives? The roads!” He paused for effect, then lowered his voice. “Where would the public be if you boys didn’t keep them roads rolling? Behind the eight ball, and everybody knows it. But do they appreciate it? *Pfui!* Did we ask for too much? Were our demands unreasonable? ‘The right to resign whenever we want to.’ Every working stiff in any other job has that. ‘The same pay as the engineers.’ Why not? Who are the real engineers around here? D’yuh have to be a cadet in a funny little hat before you can learn to wipe a bearing, or jack down a rotor? Who earns his keep: The gentlemen in the control offices, or the boys down inside? What else do we ask? ‘The right to elect our own engineers.’ Why the hell not? Who’s competent to pick engineers? The technicians—or some damn dumb examining board that’s never been down inside, and couldn’t tell a rotor bearing from a field coil?”

He changed his pace with natural art, and lowered his voice still further. “I tell you, brother, it’s time we quit fiddlin’ around with petitions to the Transport Commission, and use a little direct action. Let ’em yammer about democracy; that’s a lot of eyewash—we’ve got the power, and we’re the men that count!”

A man had risen in the back of the hall while the speaker was haranguing. He spoke up as the speaker paused. “Brother chairman,” he drawled, “may I stick in a couple of words?”

“You are recognized, Brother Harvey.”

“What I ask is: “What’s all the shootin’ for? We’ve got the highest hourly rate of pay of any mechanical guild, full insurance and retirement, and safe working conditions, barring the chance of going deaf.” He pushed his antinoise helmet farther back from his ears. He was still in dungarees, apparently just up from standing watch. “Of course we have to give ninety days’ notice to quit a job, but, cripes, we knew that when we signed up. The roads have got to roll—they can’t stop every time some lazy punk gets tired of his billet.

“And now Soapy”—the crack of the gavel cut him short—“Pardon me, I mean *Brother Soapy*—tells us how powerful we are, and how we should go in for direct action. Rats! Sure, we could tie up the roads, and play hell with the whole community—but so could any screwball with a can of nitroglycerin, and he wouldn’t have to be a technician to do it, neither.

“We aren’t the only frogs in the puddle. Our jobs are important, sure, but where would we be without the farmers—or the steel workers—or a dozen other trades and professions?”

He was interrupted by a sallow little man with protruding upper teeth, who said: “Just a minute, Brother Chairman, I’d like to ask Brother Harvey a question,” then turned to Harvey and inquired in a sly voice: “Are you speaking for the guild, brother—or just for yourself? Maybe you don’t believe in the guild? You wouldn’t by any chance be”—he stopped and slid his eyes up and down Harvey’s lank frame—“a *spotter*, would you?”

Harvey looked over his questioner as if he had found something filthy in a plate of food. “Sikes,” he told him, “if you weren’t a runt, I’d stuff your store teeth down your throat. I helped found this guild. I was on strike in ’60. Where were you in ’60? With the finks?”

The chairman’s gavel pounded. “There’s been enough of this,” he said. “Nobody that knows anything about the history of this guild doubts the loyalty

of Brother Harvey. We'll continue with the regular order of business." He stopped to clear his throat. "Ordinarily, we don't open our floor to outsiders, and some of you boys have expressed a distaste for some of the engineers we work under, but there is one engineer we always like to listen to whenever he can get away from his pressing duties. I guess maybe it's because he's had dirt under his nails the same as us. Anyhow, I present at this time Mr. Shorty van Kleeck—"

A shout from the floor stopped him. "*Brother van Kleeck!*"

"O.K., Brother van Kleeck, chief deputy engineer of this roadtown."

"Thanks, Brother Chairman." The guest speaker came briskly forward, and grinned expansively at the crowd. He seemed to swell under their approval. "Thanks, brothers. I guess our chairman is right. I always feel more comfortable here in the guild hall of the Sacramento Sector—or any guild hall for that matter—than I do in the engineers' clubhouse. Those young punk cadet engineers get in my hair. Maybe I should have gone to one of the fancy technical institutes, so I'd have the proper point of view, instead of coming up from down inside.

"Now, about those demands of yours that the Transport Commission just threw back in your face—Can I speak freely?"

"Sure you can, Shorty! You can trust, us!"

"Well, of course I shouldn't say anything, but I can't help but understand how you feel. The roads are the big show these days, and you are the men who make them roll. It's the natural order of things that your opinions should be listened to, and your desires met. One would think that even politicians would be bright enough to see that. Sometimes, lying awake at night, I wonder why we technicians don't just take things over, and—"

"YOUR wife is calling, Mr. Gaines."

"Very well." He flicked off the office intercommunicator and picked up a telephone handset from his desk. "Yes, darling, I know I promised, but . . . You're perfectly right, darling, but Washington has especially requested that we show Mr. Blekinsop anything he wants to see. I didn't know he was arriving today . . . No, I can't turn him over to a subordinate. It wouldn't be courteous. He's Minister of Transport for Australia. I told you that . . . Yes, darling, I know that courtesy begins at home, but the roads must roll. It's my job; you knew that when you married me. And this is part of my job . . . That's a good girl. We'll positively have breakfast together. Tell you what, order horses and a breakfast pack and we'll make it a picnic. I'll meet you in Bakersfield—usual place . . . Good-by, darling. Kiss Junior good night for me."

He replaced the handset, whereupon the pretty but indignant features of his wife faded from the visor screen. A young woman came into his office. As she opened the door, she exposed momentarily the words painted on its outer side: "Diego-Reno Roadtown, Office of the Chief Engineer." He gave her a harassed glance.

"Oh, it's you. Don't marry an engineer, Dolores, marry an artist. They have more home life."

"Yes, Mr. Gaines. Mr. Blekinsop is here, Mr. Gaines."

"Already? I didn't expect him so soon. The Antipodes ship must have grounded early."

"Yes, Mr. Gaines."

"Dolores, don't you ever have any emotions?"

"Yes, Mr. Gaines."

"Hm-m-m, it seems incredible, but you are never mistaken. Show Mr. Blekinsop in."

"Very good, Mr. Gaines."

Larry Gaines got up to greet his visitor. Not a particularly impressive little guy, he thought, as they shook hands and exchanged formal amenities. The rolled umbrella, the bowler hat, were almost too good to be true. An Oxford accent partially masked the underlying clipped, flat, nasal twang of the native Australia.

"It's a pleasure to have you here, Mr. Blekinsop, and I hope we can make your stay enjoyable."

The little man smiled. "I'm sure it will be. This is my first visit to your wonderful country. I feel at home already. The eucalyptus trees, you know, and the brown hills—"

"But your trip is primarily business?"

"Yes, yes. My primary purpose is to study your roadities and report to my government on the advisability of trying to adapt your startling American methods to our social problems Down Under. I thought you understood that such was the reason I was sent to you."

"Yes, I did, in a general way. I don't know just what it is that you wish to find out. I suppose that you have heard about our roadtowns, how they came about, how they operate, and so forth."

"I've read a good bit, true, but I am not a technical man, Mr. Gaines, not an engineer. My field is social and political. I want to see how this remarkable technical change has affected your people. Suppose you tell me about the roads as if I were entirely ignorant. And I will ask questions."

"That seems a practical plan. By the way, how many are there in your party?"

"Just myself. My secretary went on to Washington."

"I see." Gaines glanced at his wrist watch. "It's nearly dinner time. Suppose we run up to the Stockton Sector for dinner. There is a good Chinese restaurant up there that I'm partial to. It will take us about an hour and you can see the ways in operation while we ride."

"Excellent."

Gaines pressed a button on his desk, and a picture formed on a large visor screen mounted on the opposite wall. It showed a strongboned, angular young man seated at a semicircular control desk, which was backed by a complex instrument board. A cigarette was tucked in one corner of his mouth.

The young man glanced up, grinned, and waved from the screen. "Greetings and salutations, chief. "What can I do for you?"

"Hi, Dave. You've got the evening watch, eh? I'm running up to the Stockton Sector for dinner. Where's Van Kleeck?"

"Gone to a meeting somewhere. He didn't say."

"Anything to report?"

"No, sir. The roads are rolling, and all the little people are going ridey-ridey home to their dinners."

"O.K.—keep 'em rolling."

"They'll roll, chief."

Gaines snapped off the connection and turned to Blekinsop. "Van Kleeck is my chief deputy. I wish he'd spend more time on the road and less on politics. Davidson can handle things, however. Shall we go?"

THEY GLIDED down an electric staircase, and debouched on the walkway which bordered the northbound five-mile-an-hour strip. After skirting a stairway trunk marked "Overpass to Southbound Road," they paused at the edge of the

first strip. "Have you ever ridden a conveyor strip before?" Gaines inquired. "It's quite simple. Just remember to face against the motion of the strip as you get on."

They threaded their way through homeward-bound throngs, passing from strip to strip. Down the center of the twenty-mile-an-hour strip ran a glassite partition which reached nearly to the spreading roof. The Honorable Mr. Blekinsop raised his eyebrows inquiringly as he looked at it.

"Oh, that?" Gaines answered the unspoken question as he slid back a panel door and ushered his guest through. "That's a wind break. If we didn't have some way of separating the air currents over the strips of different speeds, the wind would tear our clothes off on the hundred-mile-an-hour strip." He bent his head to Blekinsop's as he spoke, in order to cut through the rush of air against the road surfaces, the noise of the crowd, and the muted roar of the driving mechanism concealed beneath the moving strips. The combination of noises inhibited further conversation as they proceeded toward the middle of the roadway. After passing through three more wind screens located at the forty, sixty, and eighty-mile-an-hour strips, respectively, they finally reached the maximum-speed strip, the hundred-mile-an-hour strip, which made the round trip, San Diego to Reno and back, in twelve hours.

Blekinsop found himself on a walkway, twenty feet wide, facing another partition. Immediately opposite him an illuminated show-window proclaimed:

JAKE'S STEAK HOUSE No. 4
The Fastest Meal on the Fastest Road!
"To dine on the fly Makes the miles roll by!"

"Amazing!" said Mr. Blekinsop. "It would be like dining in a tram. Is this really a proper restaurant?"

"One of the best. Not fancy, but sound."

"Oh, I say, could we—"

Gaines smiled at him. "You'd like to try it, wouldn't you, sir?"

"I don't wish to interfere with your plans—"

"Quite all right. I'm hungry myself, and Stockton is a long hour away. Let's go in."

Gaines greeted the manageress as an old friend. "Hello, Mrs. McCoy. How are you tonight?"

"If it isn't the chief himself! It's a long time since we've had the pleasure of seeing your face." She led them to a booth somewhat detached from the crowd of dining commuters. "And will you and your friend be having dinner?"

"Yes, Mrs. McCoy. Suppose you order for us—but be sure it includes one of your steaks."

"Two inches thick—from a steer that died happy." She glided away, moving her fat frame with surprising grace.

With sophisticated foreknowledge of the chief engineer's needs, Mrs. McCoy had left a portable telephone at the table. Gaines plugged it into an accommodation jack at the side of the booth, and dialed a number.

"Hello—Davidson? Dave, this is the chief. I'm in Jake's Steak House No. 4 for supper. You can reach me by calling 10-L-6-6."

He replaced the handset, and Blekinsop inquired politely: "Is it necessary for you to be available at all times?"

"Not strictly necessary," Gaines told him, "but I feel safer when I am in touch. Either Van Kleeck, or myself, should be where the senior engineer of the watch—that's Davidson this shift—can get hold of us in a pinch. If it's a real emergency, I want to be there, naturally."

“What would constitute a real emergency?”

“Two things, principally. A power failure on the rotors would bring the road to a standstill, and possibly strand millions of people a hundred miles, or more, from their homes. If it happened during a rush hour, we would have to evacuate those millions from the road—not too easy to do.”

“You say millions—as many as that?”

“Yes, indeed. There are twelve million people dependent on this roadway, living and working in the buildings adjacent to it, or within five miles of each side.”

THE AGE OF POWER blends into the Age of Transportation almost imperceptibly, but two events stand out as landmarks in the change: The invention of the Sun-power screen, and the opening of the first moving road. The power resources of oil and coal of the United States had—save for a few sporadic outbreaks of common sense—been shamefully wasted in their development all through the first half of the Twentieth Century. Simultaneously, the automobile, from its humble start as a one-lunged horseless carriage, grew into a steelbodied monster of over a hundred horsepower and capable of making more than a hundred miles an hour. They boiled over the countryside, like yeast in ferment. In 1945 it was estimated that there was a motor vehicle for every two persons in the United States.

They contained the seeds of their own destruction. Seventy million steel juggernauts, operated by imperfect human beings at high speed, are more destructive than war. In the same reference year the premiums paid for compulsory liability and property damage insurance by automobile owners exceeded in amount the sum paid the same year to purchase automobiles. Safe driving campaigns were chronic phenomena, but were mere pious attempts to put Humpty-Dumpty together again. It was not physically possible to drive safely in those crowded metropolises. Pedestrians were sardonically divided into two classes, the quick, and the dead.

But a pedestrian could be defined as a man who had found a place to park his car. The automobile made possible huge cities, then choked those same cities to death with their numbers. In 1900 Herbert George Wells pointed out that the saturation point in the size of a city might be mathematically predicted in terms of its transportation facilities. From a standpoint of speed alone the automobile made possible cities two hundred miles in diameter, but traffic congestion, and the inescapable, inherent danger of high-powered, individually operated vehicles canceled out the possibility.

In 1945 Federal Highway No. 00 from Los Angeles to Chicago, “The Main Street of America,” was transformed into a superhighway for motor vehicles, with an underspeed limit of sixty miles per hour. It was planned as a public works project to stimulate heavy industry; it had an unexpected by-product. The great cities of Chicago and St. Louis stretched out urban pseudopods toward each other, until they met near Bloomington, Illinois. The two parent cities actually shrunk in population.

The same year the city of San Francisco replaced its antiquated cable cars with moving stairways, powered with the Douglas-Martin Solar Reception Screens. The largest number of automobile licenses in history had been issued that calendar year, but the end of the automobile was in sight. The National Defense Act of 1947 closed its era.

This act, one of the most bitterly debated ever to be brought out of committee, declared petroleum to be an essential and limited material of war.

The army and navy had first call on all oil, above or below the ground, and seventy million civilian vehicles faced short and expensive rations.

Take the superhighways of the period, urban throughout their length. Add the mechanized streets of San Francisco's hills. Heat to boiling point with an imminent shortage of gasoline. Flavor with Yankee ingenuity. The first mechanized road was opened, in 1950, between Cincinnati and Cleveland.

It was, as one would expect, comparatively primitive in design. The fastest strip moved only thirty miles per hour, and was quite narrow, for no one had thought of the possibility of locating retail trade on the strips themselves. Nevertheless, it was a prototype of the social pattern which was to dominate the American scene within the next two decades—neither rural nor urban, but partaking equally of both, and based on rapid, safe, cheap, convenient transportation.

Factories—wide, low buildings whose roofs were covered with solar power screens of the same type that drove the road—lined the roadway on each side. Back of them and interspersed among them were commercial hotels, retail stores, theaters, apartment houses. Beyond this long, thin, narrow strip was the open countryside, where much of the population lived. Their homes dotted the hills, hung on the banks of creeks, and nestled between the farms. They worked in the "city," but lived in the "country"—and the two were not ten minutes apart.

MRS. MCCOY served the chief and his guest in person. They checked their conversation at the sight of the magnificent steaks.

Up and down the six-hundred-mile line, sector engineers of the watch were getting in their hourly reports from their subsector technicians. "Subsector One—check!"

"Subsector Two—check!" Tensiometer readings, voltage, load, bearing temperatures, synchrotachometer readings—"Subsector Seven—check!" Hardbitten, able men in dungarees, who lived much of their lives down inside amidst the unmuted roar of the hundred-mile strip, the shrill whine of driving rotors, and the complaint of the relay rollers.

Davidson studied the moving model of the road, spread out before him in the main control room at Fresno Sector. He watched the barely perceptible crawl of the miniature hundred-mile strip and subconsciously noted the reference number on it which located Jake's Steak House No. 4. The chief would be getting into Stockton soon; he'd give him a ring after the hourly reports were in. Everything was quiet; traffic tonnage normal for rush hour; he would be sleepy before this watch was over. He turned to his cadet engineer of the watch. "Mr. Barnes."

"Yes, sir."

"I think we could use some coffee."

"Good idea, sir. I'll order some as soon as the hourlies are in."

The minute hand of the control board chronometer reached twelve. The cadet watch officer threw a switch. "All sectors, report!" he said, in crisp, self-conscious tones.

The faces of two men flicked into view on the visor screen. The younger answered him with the same air of acting under supervision. "Diego Circle—rolling!"

They were at once replaced by two more. "Angeles Sector—rolling!"

Then: "Bakerfield Sector—rolling!"

And: "Stockton Sector—rolling!" Finally, when Reno Circle had reported, the cadet turned to Davidson and reported: "Rolling, sir."

“Very well—keep them rolling!” The visor screen flashed on once more. “Sacramento Sector—supplementary report.”

“Proceed.”

“Cadet Engineer Guenther, while on visual inspection as cadet sector engineer of the watch, found Cadet Engineer Alec Jeans, on watch as cadet subsector technician, and R.J. Ross, technician second class, on watch as technician for the same subsector, engaged in playing cards. It was not possible to tell with any accuracy how long they had neglected to patrol their subsector.”

“Any damage?”

“One rotor running hot, but still synchronized. It was jacked down, and replaced.”

“Very well. Have the paymaster give Ross his time, and turn him over to the civil authorities. Place Cadet Jeans under arrest and order him to report to me.”

“Very well, sir.”

“Keep them rolling!”

Davidson turned back to the control desk and dialed Chief Engineer Gaines’ temporary number.

“YOU MENTIONED that there were two things that could cause major trouble on the road, Mr. Gaines, but you spoke only of power failure to the rotors.”

Gaines pursued an elusive bit of salad before answering. “There really isn’t a second major trouble—it won’t happen. However—we are traveling along here at one hundred miles per hour. Can you visualize what would happen if this strip under us should break?”

Mr. Blekinsop shifted nervously in his chair. “Hm-m-m! Rather a disconcerting idea, don’t you think? I mean to say, one is hardly aware that one is traveling at high speed, here in this snug room. What *would* the result be?”

“Don’t let it worry you; the strip can’t part. It is built up of overlapping sections in such a fashion that it has a safety factor of better than twelve to one. Several miles of rotors would have to shut down all at once, and the circuit breakers for the rest of the line fail to trip out before there could possibly be sufficient tension on the strip to cause it to part.

“But it happened once, on the Philadelphia-Jersey City road, and we aren’t likely to forget it. It was one of the earliest high-speed roads, carrying a tremendous passenger traffic, as well as heavy freight, since it serviced a heavily industrialized area. The strip was hardly more than a conveyor belt, and no one had foreseen the weight it would carry. It happened under maximum load, naturally, when the high-speed way was crowded. The part of the strip behind the break buckled for miles, crushing passengers against the roof at eighty miles per hour. The section forward of the break cracked like a whip, spilling passengers onto the slower ways, dropping them on the exposed rollers and rotors down inside, and snapping them up against the roof.

“Over three thousand people were killed in that one accident, and there was much agitation to abolish the roads. They were even shut down for a week by presidential order, but he was forced to reopen them again. There was no alternative.”

“Really? Why not?”

“The country had become economically dependent on the roads. They were the principal means of transportation in the industrial areas—the only means of economic importance. Factories were shut down; food didn’t move; people got hungry—and the president was forced to let them roll again. It was the only thing that could be done; the social pattern had crystallized in one form, and it

couldn't be changed overnight. A large, industrialized population must have large-scale transportation, not only for people, but for trade."

Mr. Blekinsop fussed with his napkin, and rather diffidently suggested: "Mr. Gaines, I do not intend to disparage the ingenious accomplishments of your great people, but isn't it possible that you may have put too many eggs in one basket in allowing your whole economy to become dependent on the functioning of one type of machinery?"

Gaines considered this soberly. "I see your point. Yes—and no. Every civilization above the peasant-and-village type is dependent on some key type of machinery. The old South was based on the cotton gin. Imperial England was made possible by the steam engine. Large populations have to have machines for power, for transportation, and for manufacturing in order to live. Had it not been for machinery the large populations could never have grown up. That's not a fault of the machine; that's its virtue.

"But it is true that whenever we develop machinery to the point where it will support large populations at a high standard of living we are then bound to keep that machinery running, or suffer the consequences. But the real hazard in that is not the machinery, but the men who run the machinery. These roads, as machines, are all right. They are strong and safe and will do everything they were designed to do. No, it's not the machines, it's the men.

"When a population is dependent on a machine, they are hostages of the men who tend the machines. If their morale is high, their sense of duty strong—"

Someone up near the front of the restaurant had turned up the volume control of the radio, letting out a blast of music that drowned out Gaines' words. When the sound had been tapered down to a more nearly bearable volume, he was saying:

"Listen to that. It illustrates my point."

BLEKINSOP turned an ear to the music. It was a swinging march of compelling rhythm, with a modern interpretive arrangement. One could hear the roar of machinery, the repetitive clatter of mechanisms. A pleased smile of recognition spread over the Australian's face. "It's your field artillery song, 'The Roll of the Caissons,' isn't it? But I don't see the connection."

"You're right; it was 'The Roll of the Caissons,' but we adapted it to our own purposes. It's 'The Road Song of the Transport Cadets,' too. Wait!"

The persistent throb of the march continued, and seemed to blend with the vibration of the roadway underneath into a single timpano. Then a male chorus took up the verse:

"Hear them hum!
Watch them run!
Oh, our job is never done,
For our roadways go rolling along!
While you ride;
While you glide;
We are watching down inside,
So your roadways keep rolling along!

"Oh, it's Hie! Hie! Hee!
The rotor men are we—
Check off the sectors loud and strong!
ONE! TWO! THREE!
Anywhere you go
You are bound to know
That your roadways are rolling along!"

KEEP THEM ROLLING!
That your roadways are rolling along!"

"See?" said Gaines, with more animation in his voice. "See? That is the real purpose of the United States Academy of Transport. That is the reason why the transport engineers are a semimilitary profession, with strict discipline. We are the bottle neck, the *rina qua nan*, of all industry, all economic life. Other industries can go on strike, and only create temporary and partial dislocations. Crops can fail here and there, and the country takes up the slack. But if the roads stop rolling, everything else must stop; the effect would be the same as a general strike—with this important difference: It takes a majority of the population, fired by a real feeling of grievance, to create a general strike; but the men that run the roads, few as they are, can create the same complete paralysis.

"We had just one strike on the roads, back in two. It was justified, I think, and it corrected a lot of real abuses—but it mustn't happen again."

"But what is to prevent it happening again, Mr. Gaines?"

"Morale—*esprit de corps*. The technicians in the road service are indoctrinated constantly with the idea that their job is a sacred trust. Besides, we do everything we can to build up their social position. But even more important is the academy. We try to turn out graduate engineers imbued with the same loyalty, the same iron self-discipline, and determination to perform their duty to the community at any cost, that Annapolis and West Point and Goddard are so successful in inculcating in their graduates."

"Goddard? Oh, yes, the rocket field. And have you been successful, do you think?"

"Not entirely, perhaps, but we will be. It takes time to build up a tradition. When the oldest engineer is a man who entered the academy in his teens, we can afford to relax a little and treat it as a solved problem."

"I suppose you are a graduate?" Gaines grinned. "You flatter me—I must look younger than I am. No, I'm a carry-over from the army. You see, the war department operated the roads for some three months during reorganization after the strike in '60. I served on the conciliation board that awarded pay increases and adjusted working conditions, then I was assigned—"

The signal light of the portable telephone glowed red. Gaines said, "Excuse me," and picked up the handset. "Yes?"

Blekinsop could overhear the voice at the other end. "This is Davidson, chief. The roads are rolling."

"Very well. Keep them rolling!"

"Had another trouble report from the Sacramento Sector?"

"Again? What this time?"

Before Davidson could reply he was cut off. As Gaines reached out to dial him back, his coffee cup, half full, landed in his lap. Blekinsop was aware, even as he was lurched against the edge of the table, of a disquieting change in the hum of the roadway.

"What has happened, Mr. Gaines?"

"Don't know. Emergency stop—God knows why." He was dialing furiously. Shortly he flung the phone down, without bothering to return the handset to its cradle. "Phones are out. Come on! No! You'll be safe here. Wait."

"Must I?"

"Well, come along then, and stick close to me." He turned away, having dismissed the Australian cabinet minister from his mind. The strip ground slowly to a rest, the giant rotors and myriad rollers acting as flywheels in preventing a disastrous sudden stop. Already a little knot of commuters,

disturbed at their evening meal, were attempting to crowd out the door of the restaurant.

“Halt!”

There is something about a command issued by one used to being obeyed which enforces compliance. It may be intonation, or possibly a more esoteric power, such as animal tamers are reputed to be able to exercise in controlling ferocious beasts. But it does exist, and can be used to compel even those not habituated to obedience.

The commuters stopped in their tracks.

Gaines continued: “Remain in the restaurant until we are ready to evacuate you. I am the chief engineer. You will be in no danger here. You!” He pointed to a big fellow near the door. “You’re deputized. Don’t let anyone leave without proper authority. Mrs. McCoy, resume serving dinner.”

GAINES strode out the door, Blekinsop tagging along. The situation outside permitted no such simple measures. The hundred-mile strip alone had stopped; twenty feet away the next strip flew by at an unchecked ninety-five miles an hour. The passengers on it flickered past, unreal cardboard figures.

The twenty-foot walkway of the maximum speed strip had been crowded when the breakdown occurred. Now the customers of shops, of lunch stands, and of other places of business, the occupants of lounges, of television theaters—all came crowding out onto the walkway to see what had happened. The first disaster struck almost immediately.

The crowd surged, and pushed against a middle-aged woman on its outer edge. In attempting to recover her balance she put one foot over the edge of the flashing ninety-five-mile strip. She realized her gruesome error, for she screamed before her foot touched the ribbon.

She spun around and landed heavily on the moving strip, and was rolled by it, as the strip attempted to impart to her mass, at one blow, a velocity of ninety-five miles per hour—one hundred and thirty-nine feet per second. As she rolled she mowed down some of the cardboard figures as a sickle strikes a stand of grass. Quickly, she was out of sight, her identity, her injuries, and her fate undetermined, and already remote.

But the consequences of her mishap were not done with. One of the flickering cardboard figures bowled over by her relative moment fell toward the hundred-mile strip, slammed into the shockbound crowd, and suddenly appeared as a live man—but broken and bleeding—amidst the luckless, fallen victims whose bodies had checked his wild flight.

Even there it did not end. The disaster spread from its source, each hapless human ninepin more likely than not to knock down others so that they fell over the danger-laden boundary, and in turn ricocheted to a dearly-bought equilibrium.

But the focus of calamity sped out of sight, and Blekinsop could see no more. His active mind, accustomed to dealing with large numbers of individual human beings, multiplied the tragic sequence he had witnessed by twelve hundred miles of thronged conveyor strip, and his stomach chilled.

To Blekinsop’s surprise, Gaines made no effort to succor the fallen, nor to quell the fear-infected mob, but turned an expressionless face back to the restaurant. When Blekinsop saw that he was actually reentering the restaurant, he plucked at Gaines’ sleeve. “Aren’t we going to help those poor people?”

The cold planes of the face of the man who answered him bore no resemblance to his genial, rather boyish host of a few minutes before. “No.

Bystanders can help them—I've got the whole road to think of. Don't bother me."

Crushed, and somewhat indignant, the politician did as he was ordered. Rationally, he knew that the chief engineer was right—a man responsible for the safety of millions cannot turn aside from his duty to render personal service to one—but the cold detachment of such viewpoint was repugnant to him.

Gaines was back in the restaurant. "Mrs. McCoy, where is your getaway?"

"In the pantry, sir."

Gaines hurried there, Blekinsop at his heels. A nervous Filipino salad boy shrank out of Gaines' way as he casually swept a supply of prepared green stuffs onto the floor, and stepped up on the counter where they had rested. Directly above his head and within reach was a circular manhole, counterweighted and operated by a handwheel set in its center. A short steel ladder, hinged to the edge of the opening, was swung up flat to the ceiling and secured by a hook.

Blekinsop lost his hat in his endeavor to clamber quickly enough up the ladder after Gaines. When he emerged on the roof of the building, Gaines was searching the ceiling of the roadway with a pocket flashlight. He was shuffling along, stooped double in the awkward four feet of space between the roof underfoot and ceiling.

He found what he sought, sortie fifty feet away—another manhole similar to the one they had used to escape from below. He spun the wheel of the lock, and stood up in the space, then rested his hands on the sides of the opening, and with a single lithe movement vaulted to the roof of the roadways. His companion followed him with more difficulty.

They stood in darkness, a fine, cold rain feeling at their faces. But underfoot, and stretching beyond sight on each hand, the Sun-power screens glowed with a faint opalescent radiance, their slight percentage of inefficiency as transformers of radiant Sun power to available electrical power being evidenced as a mild induced radioactivity. The effect was not illumination, but rather like the ghostly sheen of a snow-covered plain seen by starlight.

THE GLOW picked out the path they must follow to reach the rain-obscured wall of buildings bordering the ways. The path was a narrow black stripe which arched away into the darkness over the low curve of the roof. They started away on this path at a dogtrot, making as much speed as the slippery footing and the dark permitted, while Blekinsop's mind still fretted at the problem of Gaines' apparently callous detachment. Although possessed of a keen intelligence, his nature was dominated by a warm, human sympathy, without which no politician, irrespective of other virtues or shortcomings, is long successful.

Because of this trait he distrusted instinctively any mind which was guided by logic alone. He was aware that, from a standpoint of strict logic, no reasonable case could be made out for the continued existence of the human race, still less for the human values he served.

Had he been able to pierce the preoccupation of his companion, he would have been reassured. On the surface, Gaines' exceptionally intelligent mind was clicking along with the facile ease of an electromechanical integrator—arranging data at hand, making tentative decisions, postponing judgments without prejudice until necessary data were available, exploring alternatives. Underneath, in a compartment insulated by stern self-discipline from the acting theater of his mind, his emotions were a torturing storm of self reproach. He was heartsick at the suffering he had seen, and which he knew too well was duplicated up and down the line. Although he was not aware of any personal

omission, nevertheless the fault was somehow his, for authority creates responsibility.

He had carried too long the superhuman burden of kingship—which no sane mind can carry light-heartedly—and was at this moment perilously close to the frame of mind which sends captains down with their ships. But the need for immediate, constructive action sustained him.

But no trace of this conflict reached his features.

At the wall of buildings glowed a green line of arrows, pointing to the left. Over them, at the terminus of the narrow path, shone a sign: "Access down." They pursued this, Blekinsop puffing in Gaines' wake, to a door let in the wall, which gave into a narrow stairway lighted by a single glow tube. Gaines plunged down this, still followed, and they emerged on the crowded, noisy, stationary walkway adjoining the northbound road.

Immediately adjacent to the stairway, on the right, was a public telebooth. Through the glassite door they could see a portly, well-dressed man speaking earnestly to his female equivalent, mirrored in the visor screen. Three other citizens were waiting outside the booth.

GAINES pushed past them, flung open the door, grasped the bewildered and indignant man by the shoulders and hustled him outside, kicking the door closed after him. He cleared the visor screen with one sweep of his hand, before the matron pictured therein could protest, and pressed the emergency-priority button.

He dialed his private code number, and was shortly looking into the troubled face of his engineer of the watch, Davidson.

"Report!"

"It's you, chief! Thank God! Where are you?" Davidson's relief was pathetic.

"Report!"

The senior watch officer repressed his emotion, and complied in direct, clipped phrases: "At 7:09 p.m. the consolidated tension reading, Strip 20, Sacramento Sector, climbed suddenly. Before action could be taken, tension on Strip 20 passed emergency level; the interlocks acted, and power to subject strip cut out. Cause of failure unknown. Direct communication to Sacramento control office has failed. They do not answer the auxiliary, nor commercial. Effort to re-establish communication continues. Messenger dispatched from Stockton Subsector 10.

"No casualties reported. Warning broadcast by public announcement circuit to keep clear of Strip 19. Evacuation has commenced."

"There are casualties," Gaines cut in. "Police and hospital emergency routine. Move!"

"Yes, sir!" Davidson snapped back, and hooked a thumb over his shoulder—but his cadet officer of the watch had already jumped to comply. "Shall I cut out the rest of the road, chief?"

"No. No more casualties are likely after the first disorder. Keep up the broadcast warnings. Keep those other strips rolling, or we will have a traffic jam the devil himself couldn't untangle."

Gaines had in mind the impossibility of bringing the strips up to speed under load. The rotors were not powerful enough to do this. If the entire road was stopped, he would have to evacuate every strip, correct the trouble on Strip 20, bring all strips up to speed, and then move the accumulated peak-load traffic. In the meantime, over five million stranded passengers would constitute a tremendous police problem. It was simpler to evacuate passengers on Strip 20 over the roof, and allow them to return home via the remaining strips.

“Notify the mayor and the governor that I have assumed emergency authority. Same to the chief of police and place him under your orders. Tell the commandant to arm all cadets available and await orders. Move!”

“Yes, sir. Shall I recall technicians off watch?”

“No. This isn’t an engineering failure. Take a look at your readings; that entire sector went out simultaneously. Somebody cut out those rotors by hand. Place off-watch technicians on standby status—but don’t arm them, and don’t send them down inside. Tell the commandant to rush all available senior-class cadets to Stockton Subsector Office No. 10 to report to me. I want them equipped with tumble-bugs, pistols, and sleep-gas bombs.”

“Yes, sir.” A clerk leaned over Davidson’s shoulder and said something in his ear. “The governor wants to talk to you, chief.”

“Can’t do it—nor can you. Who’s your relief? Have you sent for him?”

“Hubbard—he’s just come in.”

“Have him talk to the governor, the mayor, the press—anybody that calls—even the White House. You stick to your watch. I’m cutting off. I’ll be back in communication as quickly as I can locate a reconnaissance car.” He was out of the booth almost before the screen cleared.

BLEKINSOP did not venture to speak, but followed him out to the northbound twenty-mile strip. There Gaines stopped, short of the windbreak, turned, and kept his eyes on the wall beyond the stationary walkway. He picked out some landmark or sign—not apparent to his companion—and did an Eliza crossing the ice back to the walkway, so rapidly that Blekinsop was carried some hundred feet beyond him, and almost failed to follow when Gaines ducked into a doorway, and ran down a flight of stairs.

They came out on a narrow lower walkway, down inside. The pervading din claimed them, beat upon their bodies as well as their ears. Dimly, Blekinsop perceived their surroundings, as he struggled to face that wall of sound. Facing him, illuminated by the red monochrome of a neon arc, was one of the rotors that drove the five-mile strip, its great, drum-shaped armature revolving slowly around the stationary field coils in its core. The upper surface of the drum pressed against the under side of the moving way and imparted to it its stately progress.

To the left and right, a hundred yards each way, and beyond at similar intervals, farther than he could see, were other rotors. Bridging the gaps between the rotors were the slender rollers, crowded together like cigars in a box, in order that the strip might have a continuous rolling support. The rollers were supported by steel-girder arches through the gaps of which he saw row after row of rotors in staggered succession, the rotors in each succeeding row turning over more rapidly than the last.

Separated from the narrow walkway by a line of supporting steel pillars, and lying parallel to it on the side away from the rotors, ran a shallow paved causeway, joined to the walk at this point by a ramp. Gaines peered up and down this tunnel in evident annoyance. Blekinsop started to ask him what troubled him, but found his voice snuffed out by the sound. He could not cut through the roar of thousands of rotors and the whine of hundreds of thousands of rollers.

Gaines saw his lips move, and guessed at the question. He cupped his hands around Blekinsop’s right ear, and shouted: “No car—I expected to find a car here.”

The Australian, wishing to be helpful, grasped Gaines’ arm and pointed back into the jungle of machinery. Gaines’ eye followed the direction indicated and

picked out something that he had missed in his preoccupation—a half dozen men working around a rotor several strips away. They had jacked down a rotor until it was no longer in contact with the road surface, and were preparing to replace it *in toto*. The replacement rotor was standing by on a low, heavy truck.

The chief engineer gave a quick smile of acknowledgment and thanks, and aimed his flashlight at the group, the beam focused down to a slender, intense needle of light. One of the technicians looked up, and Gaines snapped the light on and off in a repeated, irregular pattern. A figure detached itself from the group and ran toward them.

It was a slender young man, dressed in dungarees, and topped off with ear pads and an incongruous, pillbox cap, bright with gold braid and insignia. He recognized the chief engineer and saluted, his face falling into humorless, boyish intentness.

Gaines stuffed his torch into a pocket and commenced to gesticulate rapidly with both hands—clear, clean gestures, as involved and as meaningful as deaf-mute language. Blekinsop dug into his own dilettante knowledge of anthropology and decided that it was most like an American Indian sign language, with some of the finger movements of hula. But it was necessarily almost entirely strange, being adapted for a particular terminology.

The cadet answered him in kind, stepped to the edge of the causeway, and flashed his torch to the south.

He picked out a car, still some distance away, but approaching at headlong speed. It braked, and came to a stop alongside them.

IT WAS a small affair, ovoid in shape, and poised on two centerline wheels. The forward, upper surface swung up and disclosed the driver, another cadet. Gaines addressed him briefly in sign language, then hustled Blekinsop ahead of him into the cramped passenger compartment.

As the glassite hood was being swung back into place, a blast of wind smote them, and the Australian looked up in time to glimpse the last of three much larger vehicles hurtle past them. They were headed north, at a speed of not less than two hundred miles per hour. Blekinsop thought that he had made out the little hats of cadets through the windows of the last of the three, but he could not be sure.

He had no time to wonder, so violent was the driver's getaway. Gaines ignored the accelerating surge—he was already calling Davidson on the built-in communicator. Comparative silence had settled down once the car was closed. The face of a female operator at the relay station showed on the screen.

"Get me Davidson—senior watch office!"

"Oh! It's Mr. Gaines! The mayor wants to talk to you, Mr. Gaines."

"Refer him—and get me Davidson. Move!"

"Yes, sir."

"And see here—leave this circuit hooked in to Davidson's board until I tell you personally to cut it."

"Right." Her face gave way to the watch officer's.

"That you, chief? We're moving—progress O.K.—no change."

"Very well. You'll be able to raise me on this circuit, or at Subsector 10 office. Clearing now." Davidson's face gave way to the relay operator.

"Your wife is calling, Mr. Gaines. Will you take it?"

Gaines muttered something not quite gallant, and answered: "Yes." Mrs. Gaines flashed into facsimile. He burst into speech before she could open her mouth. "Darling I'm all right don't worry I'll be home when I get there I've got

to go now.” It was all out in one breath, and he slapped the control that cleared the screen.

They slammed to a breath-taking stop alongside the stair leading to the watch office of Subsector 10, and piled out. Three big lorries were drawn up on the ramp, and three platoons of cadets were ranged in restless ranks alongside them. Tumble-bugs—small, open monocycles, used to patrol down inside—were ready nearby.

A cadet trotted up to Gaines and saluted. “Lindsay, sir—cadet engineer of the watch. The engineer of the watch requests that you come at once to the control room.”

The engineer of the watch looked up as they came in. “Chief—Van Kleeck is calling you.”

“Put him on.”

When Van Kleeck appeared in the big visor, Gaines greeted him with: “Hello, Van. Where are you?”

“Sacramento office. Now listen—”

“Sacramento? That’s good! Report.”

Van Kleeck looked disgruntled. “Report, hell! I’m not your deputy any more, Gaines. Now, you—”

“What the hell are you talking about?”

“Listen, and don’t interrupt me, and you’ll find out. You’re through, Gaines. I’ve been picked as Director of the Provisional Control Committee for the New Order.”

“Van, have you gone off your rocker? What do you mean—the ‘New Order’?”

“You’ll find out. This is it—the Functionalist revolution. We’re in; you’re out. We stopped Strip 20 just to give you a little taste of what we can do.”

CONCERNING FUNCTION: *A Treatise on the Natural Order in Society*, the Bible of the Functionalist movement, was first published in 1930. It claimed to be a scientifically accurate theory of social relations. The author, Paul Decker, disclaimed the “outworn and futile” ideas of democracy and human equality, and substituted a system in which human beings were evaluated “functionally”—that is to say, by the role each filled in the economic sequence. The underlying thesis was that it was right and proper for a man to exercise over his fellows whatever power was inherent in his function, and that any other form of social organization was silly, visionary, and contrary to the “natural order.”

The complete interdependence of modern economic life seems to have escaped him entirely.

His ideas were dressed up with a glib mechanistic pseudopsychology based on the observed orders of precedence among barnyard fowls, and on the famous Pavlov conditioned reflex experiments on dogs. He failed to note that human beings are neither dogs nor chickens. Old Dr. Pavlov ignored him entirely, as he had ignored so many others who had blindly and unscientifically dogmatized about the meaning of his important, but strictly limited, experiments.

Functionalism did not take hold at once—during the ’80s almost everyone, from truck driver to hat-check girl, had a scheme for setting the world right in six easy lessons; and a surprising percentage managed to get their schemes published. But it gradually spread. Functionalism was particularly popular among little people everywhere who could persuade themselves that their particular jobs were the indispensable ones, and that therefore, under the

“natural order,” they would be top dogs. With so many different functions actually indispensable such self-persuasion was easy.

GAINES STARED at Van Kleeck for a moment before replying. “Van,” he said slowly, “you don’t really think you can get away with this, do you?”

The little man puffed out his chest. “Why not? We *have* gotten away with it. You can’t start Strip 20 until I am ready to let you, and I can stop the whole road, if necessary.”

Gaines was becoming uncomfortably aware that he was dealing with unreasonable conceit, and held himself patiently in check. “Sure you can, Van—but how about the rest of the country? Do you think the United States army will sit quietly by and let you run California as your private kingdom?”

Van Kleeck looked sly. “I’ve planned for that. I’ve just finished broadcasting a manifesto to all the road technicians in the country, telling them what we have done, and telling them to arise, and claim their rights. With every road in the country stopped, and people getting hungry, I reckon the president will think twice before sending the army to tangle with us. Oh, he could send a force to capture, or kill, me—I’m not afraid to die!—but he doesn’t dare start shooting down road technicians as a class, because the country can’t get along without us—consequently, he’ll have to get along with us—on our terms!”

There was much bitter truth in what he said. If an uprising of the road technicians became general, the government could no more attempt to settle it by force than a man could afford to cure a headache by blowing out his brains. But was the uprising general?

“Why do you think that the technicians in the rest of the country will follow your lead?”

“Why not? It’s the natural order of things. This is an age of machinery; the real power everywhere is in the technicians, but they have been kidded into not using their power with a lot of obsolete catch phrases. And of all the classes of technicians, the most important, the absolutely essential, are the road technicians. From now on they run the show—it’s the natural order of things!” He turned away for a moment and fussed with some papers on the desk before him; then he added: “That’s all for now, Gaines—I’ve got to call the White House, and let the President know how things stand. You carry on, and behave yourself, and you won’t get hurt.”

Gaines sat quite still for some minutes after the screen cleared. So that’s how it was. He wondered what effect, if any, Van Kleeck’s invitation to strike had had on road technicians elsewhere. None, he thought—but then he had not dreamed that it could happen among his own technicians. Perhaps he had made a mistake in refusing to take time to talk to anyone outside the road. No—if he had stopped to talk to the governor, or the newspapermen, he would still be talking. Still—

He dialed Davidson.

“Any trouble in any other sectors, Dave?”

“No, chief.”

“Or on any other road?”

“None reported.”

“Did you hear my talk with Van Kleeck?”

“I was cut in—yes.”

“Good. Have Hubbard call the President and the governor, and tell them that I am strongly opposed to the use of military force as long as the outbreak is limited to this one road. Tell them that I will not be responsible if they move in before I ask for help.”

Davidson looked dubious. "Do you think that is wise, chief?"

"I do! If we try to blast Van and his red-hots out of their position, we may set off a real, countrywide uprising. Furthermore, he could wreck the road so that God himself couldn't put it back together. What's your rolling tonnage now?"

"Fifty-three percent under evening peak."

"How about Strip 20?"

"Almost evacuated."

"Good. Get the road clear of all traffic as fast as possible. Better have the chief of police place a guard on all entrances to the road to keep out new traffic. Van may stop all the strips any time—or I may need to myself. Here is my plan: I'm going down inside with these armed cadets. We will work north, overcoming any resistance we meet. You arrange for watch technicians and maintenance crews to follow immediately behind us. Each rotor, as they come to it, is to be cut out, then hooked into the Stockton control board. It will be a haywire rig, with no safety interlocks, so use enough watch technicians to be able to catch trouble before it happens.

"If this scheme works, we can move control of the Sacramento Sector right out from under Van's feet, and he can stay in his Sacramento control office until he gets hungry enough to be reasonable."

He cut off and turned to the subsector engineer of the watch. "Edmunds, give me a helmet—and a pistol."

"Yes, sir." He opened a drawer, and handed his chief a slender, deadly-looking weapon. Gaines belted it on, and accepted a helmet, into which he crammed his head, leaving the antinoise ear flaps up. Blekinsop cleared his throat.

"May . . . uh . . . may I have one of those helmets?" he inquired.

"What?" Gaines focused his attention. "Oh—You won't need one, Mr. Blekinsop. I want you to remain right here until you hear from me."

"But—" The Australian statesman started to speak, thought better of it, and subsided.

FROM the doorway the cadet engineer of the watch demanded the chief engineer's attention. "Mr. Gaines, there is a technician out here who insists on seeing you—a man named Harvey."

"Can't do it."

"He's from the Sacramento Sector, sir."

"Oh! Send him in."

Harvey quickly advised Gaines of what he had seen and heard at the guild meeting that afternoon. "I got disgusted and left while they were still jawin', chief. I didn't think any more about it until Strip 20 stopped rolling. Then I heard that the trouble was in Sacramento Sector, and decided to look you up."

"How long has this been building up?"

"Quite some time, I guess. You know how it is. There are a few soreheads everywhere, and a lot of them are Functionalists. But you can't refuse to work with a man just because he holds different political views. It's a free country."

"You should have come to me before, Harvey." Harvey looked stubborn. Gaines studied his face. "No, I guess you are right. It's my business to keep tabs on your mates, not yours. As you say, it's a free country. Anything else?"

"Well—now that it has come to this, I thought maybe I could help you pick out the ringleaders."

"Thanks. You stick with me. We are going down inside and try to clear up this mess."

The office door opened suddenly, and a technician and a cadet appeared, lugging a burden between them. They deposited it on the floor, and waited.

It was a young man, quite evidently dead. The front of his dungaree jacket was soggy with blood. Gaines looked at the watch officer. "Who is he?"

Edmunds broke his stare and answered: "Cadet Hughes. He's the messenger I sent to Sacramento when communication failed. When he didn't report, I sent Marston and Cadet Jenkins after him."

Gaines muttered something to himself, and turned away. "Come along, Harvey."

The cadets waiting below had changed in mood. Gaines noted that the boyish intentness for excitement had been replaced by something uglier. There was much exchange of hand signals and several appeared to be checking the loading of their pistols.

He sized them up, then signaled to the cadet leader. There was a short interchange of signals. The cadet saluted, turned to his men, gesticulated briefly, and brought his arm down smartly. They filed upstairs, and into an empty standby room, Gaines following.

Once inside, and the noise shut out, he addressed them: "You saw Hughes brought in. How many of you want a chance to kill the louse that did it?"

Three of the cadets reacted almost at once, breaking ranks and striding forward. Gaines looked at them coldly. "Very well. You three turn in your weapons, and return to your quarters. Any of the rest of you that think this is a matter of private revenge, or a hunting party, may join them." He permitted a short silence to endure before continuing. "Sacramento Sector has been seized by unauthorized persons. We are going to retake it—if possible, without loss of life on either side, and, if possible, without stopping the roads. The plan is to take over down inside, rotor by rotor, and cross-connect through Stockton. The task assignment of this group is to proceed north down inside, locating and overpowering all persons in your path. You will bear in mind the probability that most of the persons you Mall arrest are completely innocent. Consequently, you will favor the use of sleep-gas bombs, and will shoot to kill only as a last resort.

"Cadet captain, assign your men in squads of ten each, with squad leader. Each squad is to form a skirmish line across down inside, mounted on tumblebugs, and will proceed north at fifteen miles per hour. Leave an interval of one hundred yards between successive waves of skirmishers. Whenever a man is sighted, the entire leading wave will converge on him, arrest him, and deliver him to a transport car, then reform in the rear of the last wave. You will assign the transports that delivered you here to hold prisoners. Instruct the drivers to keep abreast of the second wave.

"You will assign an attack group to recapture subsector control offices, but no office is to be attacked until its subsector has been cross-connected with Stockton. Arrange liaison accordingly.

"Any questions?" He let his eyes run over the faces of the young men. When no one spoke up, he turned back to the cadet in charge. "Very well, sir. Carry out your orders!"

BY THE TIME the dispositions had been completed, the follow-up crew of technicians had arrived, and Gaines had given the engineer in charge his instructions. The cadets "stood to horse" alongside their poised tumblebugs. The cadet captain looked expectantly at Gaines. He nodded, the cadet brought his arm down smartly, and the first wave mounted and moved off.

Gaines and Harvey mounted tumblebugs, and kept abreast of the cadet captain, some twenty-five yards behind the leading wave. It had been a long time since the chief engineer had ridden one of these silly-looking little vehicles,

and he felt awkward. A tumblebug does not give a man dignity, since it is about the size and shape of a kitchen stool, gyro-stabilized on a single wheel. But it is perfectly adapted to patrolling the maze of machinery down inside, since it can go through an opening the width of a man's shoulders, is easily controlled, and will stand patiently upright, waiting, should its rider dismount.

The little reconnaissance car followed Gaines at a short interval, weaving in and out among the rotors, while the television and audio communicator inside continued as Gaines' link to his other manifold responsibilities.

The first two hundred yards of Sacramento Sector passed without incident, then one of the skirmishers sighted a tumblebug parked by a rotor. The technician it served was checking the gauges at the rotor's base, and did not see them approach. He was unarmed and made no resistance, but seemed surprised and indignant, as well as very bewildered.

The little command group dropped back and permitted the new leading wave to overtake them.

Three miles farther along the score stood thirty-seven men arrested, none killed. Two of the cadets had received minor wounds, and had been directed to retire. Only four of the prisoners had been armed; one of these Harvey had been able to identify definitely as a ringleader. Harvey expressed a desire to attempt to parley with the outlaws, if any occasion arose. Gaines agreed tentatively. He knew of Harvey's long and honorable record as a labor leader, and was willing to try anything that offered a hope of success with a minimum of violence.

Shortly thereafter the first wave flushed another technician. He was on the far side of a rotor; they were almost on him before he was seen.

He did not attempt to resist, although he was armed, and the incident would not have been worth recording, had he not been talking into a hush-a-phone which he had plugged into the telephone jack at the base of the rotor.

Gaines reached the group as the capture was being effected. He snatched at the soft rubber mask of the phone, jerking it away from the man's mouth so violently that he could feel the bone-conduction receiver grate between the man's teeth. The prisoner spat out a piece of broken tooth and glared, but ignored attempts to question him.

Swift as Gaines had been, it was highly probable that they had lost the advantage of surprise. It was necessary to assume that the prisoner had succeeded in reporting the attack going on beneath the ways. Word was passed down the line to proceed with increased caution.

GAINES' PESSIMISM was justified shortly. Riding toward them appeared a group of men, as yet several hundred feet away. There were at least a score, but their exact strength could not be determined, as they took advantage of the rotors for cover as they advanced. Harvey looked at Gaines, who nodded, and signaled the cadet captain to halt his forces.

Harvey went on ahead, unarmed, his hands held high above his head, and steering by balancing the weight of his body. The outlaw party checked its speed uncertainly, and finally stopped. Harvey approached within a couple of rods of them and stopped likewise. One of them, apparently the leader, spoke to him in sign language, to which he replied.

They were too far away, and the red light too uncertain, to follow the discussion. It continued for several minutes, then ensued a pause. The leader seemed uncertain what to do. One of his party rolled forward, returned his pistol to its holster, and conversed with the leader. The leader shook his head at the man's violent gestures.

The man renewed his argument, but met the same negative response. With a final disgusted wave of his hands, he desisted, drew his pistol, and shot at Harvey. Harvey grabbed at his middle and leaned forward. The man shot again; Harvey jerked, and slid to the ground.

The cadet captain beat Gaines to the draw. The killer looked up as the bullet hit him. He looked as if he were puzzled by some strange occurrence—being too freshly dead to be aware of it.

The cadets came in shooting. Although the first wave was outnumbered better than two to one, they were helped by the comparative demoralization of the enemy. The odds were nearly even after the first ragged volley. Less than thirty seconds after the first treacherous shot all of the insurgent party were dead, wounded, or under arrest. Gaines' losses were two dead—including the murder of Harvey—and two wounded.

Gaines modified his tactics to suit the changed conditions. Now that secrecy was gone, speed and striking power were of first importance. The second wave was directed to close in practically to the heels of the first. The third wave was brought up to within twenty-five yards of the second. These three waves were to ignore unarmed men, leaving them to be picked up by the fourth wave, but they were directed to shoot on sight any person carrying arms.

Gaines cautioned them to shoot to wound, rather than to kill, but he realized that his admonishment was almost impossible to obey. There would be killing. Well—he had not wanted it, but he felt that he had no choice. Any armed outlaw was a potential killer—he could not, in fairness to his own men, lay too many restrictions on them.

When the arrangements for the new marching order were completed, he signed the cadet captain to go ahead, and the first and second waves started off together at the top speed of which the tumblebugs were capable—not quite eighteen miles per hour. Gaines followed them.

He swerved to avoid Harvey's body, glancing involuntarily down as he did so. The face was set in a death mask of rugged beauty in which the strong fiber of the dead man's character was evident. Seeing this, Gaines did not regret so much his order to shoot, but the deep sense of loss of personal honor lay more heavily on him than before.

THEY PASSED several technicians during the next few minutes, but had no occasion to shoot. Gaines was beginning to feel somewhat hopeful of a reasonably bloodless victory, when he noticed a change in the pervading throb of machinery which penetrated even through the heavy antinoise pads of his helmet. He lifted an ear pad in time to hear the end of a rumbling diminuendo as the rotors and rollers slowed to rest.

The road was stopped.

He shouted to the cadet captain: "Halt your men!" His words echoed hollowly in the unreal silence.

The top of the reconnaissance car swung up as he turned and hurried to it. "Chief," the cadet within called out, "relay station calling you."

The girl in the visor screen gave way to Davidson as soon as she recognized Gaines' face.

"Chief," Davidson said at once, "Van Kleeck's calling you."

"Who stopped the road?"

"He did."

"Any other major change in the situation?"

"No—the road was practically empty when he stopped it."

“Good. Give me Van Kleeck.” The chief conspirator’s face was livid with uncurbed anger when he identified Gaines. He burst into speech.

“So! You thought I was fooling, eh? What do you think now, Mr. Chief Engineer Gaines?”

Gaines fought down an impulse to tell him exactly what he thought, particularly about Van Kleeck. Everything about the short man’s manner affected him like a squeaking slate pencil.

But he could not afford the luxury of speaking his mind. He strove to get just the proper tone into his voice which would soothe the other man’s vanity. “I’ve got to admit that you’ve won this trick, Van—the road is stopped—but don’t think I didn’t take you seriously. I’ve watched you work too long to underrate you. I know you mean what you say.”

Van Kleeck was pleased by the tribute, but tried not to show it. “Then why don’t you get smart, and give up?” he demanded belligerently. “You can’t win.”

“Maybe not, Van, but you know I’ve got to try. Besides,” he went on, “why can’t I win? You said yourself that I could call on the whole United States army.”

Van Kleeck grinned triumphantly. “You see that?” He held up a pear-shaped electric push button, attached to a long cord. “If I push that, it will blow a path right straight across the ways—blow it to kingdom come. And just for good measure, I’ll take an ax, and wreck this control station before I leave.”

Gaines wished whole-heartedly that he knew more about psychology. Well—he’d just have to do his best, and trust to horse sense to give him the right answers. “That’s pretty drastic, Van, but I don’t see how we can give up.”

“No? You’d better have another think. If you force me to blow up the road, how about all the people that will be blown up along with it?”

Gaines thought furiously. He did not doubt that Van Kleeck would carry out his threat. His very phraseology, the childish petulance of “If you force me to do this—”, betrayed the dangerous irrationality of his frame of mind. And such an explosion anywhere in the thickly populated Sacramento Sector would be likely to wreck one or more apartment houses, and would be certain to kill shopkeepers on the included segment of Strip 20, as well as chance passers-by. Van was absolutely right; he dare not risk the lives of bystanders who were not aware of the issue and had not consented to the hazard—even if the road never rolled again.

For that matter, he did not relish chancing major damage to the road itself—but it was the danger to innocent life which left him helpless.

A tune ran through his head:

“Hear them hum; watch them run. Oh, our work is never done—”

What to do? What to do?

“While you ride; while you glide; we are—”

This wasn’t getting any place.

He turned back to the screen.

“Look, Van, you don’t want to blow up the road unless you have to, I’m sure. Neither do I. Suppose I come up to your headquarters, and we talk this thing over. Two reasonable men ought to be able to make a settlement.”

Van Kleeck was suspicious. “Is this some sort of a trick?”

“How can it be? I’ll come alone, and unarmed, just as fast as my car can get there.”

“How about your men?”

“They will sit where they are until I’m back. You can put out observers to make sure of it.”

Van Kleeck stalled for a moment, caught between the fear of a trap and the pleasure of having his erstwhile superior come to him to sue for terms. At last he grudgingly consented.

GAINES LEFT his instructions, and told Davidson what he intended to do. “If I’m not back within an hour, you’re on your own, Dave.”

“Be careful, chief.”

“I will.”

He evicted the cadet driver from the reconnaissance car, and ran it down the ramp into the causeway, then headed north and gave it the gun. Now he would have a chance to collect his thoughts, even at two hundred miles per hour. Suppose he pulled off this trick—there would still have to be some changes made. Two lessons stood out like sore thumbs: First, the strips must be cross-connected with safety interlocks so that adjacent strips would slow down, or stop, if a strip’s speed became dangerously different from those adjacent. No repetition of what happened on twenty!

But that was elementary, a mere mechanical detail. The real failure had been in men. Well, the psychological classification tests must be improved to insure that the roads employed only conscientious, reliable men. But hell’s bells—that was just exactly what the present classification tests were supposed to insure beyond question. To the best of his knowledge there had never been a failure from the improved Humm-Wadsworth-Burton method—not until today in the Sacramento Sector. How had Van Kleeck gotten one whole sector of temperament-classified men to revolt?

It didn’t make sense.

Personnel did not behave erratically without a reason. One man might be unpredictable, but in large numbers personnel were as dependable as machines, or figures. They could be measured, examined, classified. His inner eye automatically pictured the personnel office, with its rows of filing cabinets, its clerks—He’d got it! He’d got it! Van Kleeck, as chief deputy, was *ex officio* ‘personnel officer for the entire road!’

It was the only solution that covered all the facts. The personnel officer alone had the perfect opportunity to pick out all the bad apples and concentrate them in one barrel. Gaines was convinced beyond any reasonable doubt that there had been skullduggery, perhaps for years, with the temperament classification tests, and that Van Kleeck had deliberately transferred the kind of men he needed to one sector, after falsifying their records.

And that taught another lesson—tighter tests for officers, and no officer to be trusted with classification and assignment without close supervision and inspection. Even he, Gaines, should be watched in that respect. *Qui custodiet ipsos custodes?*

Who will guard those selfsame guardians? Latin might be obsolete, but those old Romans weren’t dummies.

He at last knew wherein he had failed, and he derived melancholy pleasure from the knowledge. Supervision and inspection, check and re-check, was the answer. It would be cumbersome and inefficient, but it seemed that adequate safeguards always involved some loss of efficiency.

He should not have intrusted so much authority to Van Kleeck without knowing more about him. He still should know more about him—He touched the emergency-stop button, and brought the car to a dizzying halt. “Relay station! See if you can raise my office.”

Dolores' face looked out from the screen. "You're still there—good!" he told her. "I was afraid you'd gone home."

"I came back, Mr. Caines."

"Good girl. Get me Van Kleeck's personal file jacket. I want to see his classification record."

She was back with it in exceptionally short order, and read from it the symbols and percentages. He nodded repeatedly as the data checked his hunches: Masked introvert—inferiority complex. It checked.

" 'Comment of the board' " she read. " 'In spite of the slight potential instability shown by maxima A and D on the consolidated profile curve, the board is convinced that this officer is, nevertheless, fitted for duty. He has an exceptionally fine record, and is especially adept in handling men. He is, therefore, recommended for retention and promotion.' "

"That's all. Dolores. Thanks."

"Yes, Mr. Gaines."

"I'm off for a showdown. Keep your fingers crossed."

"But, Mr. Gaines—" Back in Fresno, Dolores stared wide-eyed at an empty screen.

"TAKE me to Mr. Van Kleeck!" The man addressed took his gun out of Gaines' ribs—reluctantly, Gaines thought—and indicated that the chief engineer should precede him up the stairs. Gaines climbed out of the car, and complied.

Van Kleeck had set himself up in the sector control room proper, rather than the administrative office. With him were half a dozen men, all armed.

"Good evening, Director Van Kleeck." The little man swelled visibly at Gaines' acknowledgment of his assumed rank.

"We don't go in much around here for titles," he said, with ostentatious casualness. "Just call me Van. Sit down, Gaines."

Gaines did so. It was necessary to get those other men out. He looked at them with an expression of bored amusement. "Can't you handle one unarmed man by yourself, Van? Or don't the Functionalists trust each other?"

Van Kleeck's face showed his annoyance, but Gaines' smile was undaunted. Finally the smaller man picked up a pistol from his desk, and motioned toward the door. "Get out, you guys."

"But, Van—"

"Get out, I said!"

When they were alone, Van Kleeck picked up the electric push button which Gaines had seen in the visor screen, and pointed his pistol at his former chief. "O.K.," he growled, "try any funny stuff, and off it goes! What's your proposition?"

Gaines' irritating smile grew broader. Van Kleeck scow-led. "What's so damn funny?" he said. Gaines granted him an answer.

"You are, Van—honest, this is rich. You start a Functionalist revolution, and the only function you can think of to perform is to blow up the road that justifies your title. Tell me," he went on, "what is it you are so scared of?"

"I am not afraid!"

"Not afraid? You? Sitting there, ready to commit hara-kiri with that toy push button, and you tell me that you aren't afraid. If your buddies knew how near you are to throwing away what they've fought for, they'd shoot you in a second. You're afraid of them, too, aren't you?"

Van Kleeck thrust the push button away from him, and stood up. "I am not afraid!" he shouted, and came around the desk toward Gaines.

Gaines sat where he was, and laughed. "But you are! You're afraid of me, this minute. You're afraid I'll have you on the carpet for the way you do your job. You're afraid the cadets won't salute you. You're afraid they are laughing behind your back. You're afraid of using the wrong fork at dinner. You're afraid people are looking at you—and you are afraid that they won't notice you."

"I am not!" he protested. "You . . . you dirty, stuck-up snob! Just because you went to a high-hat school you think you're better than anybody." He choked, and became incoherent, fighting to keep back tears of rage. "You, and your nasty little cadets—"

Gaines eyed him cautiously. The weakness in the man's character was evident now—he wondered why he had not seen it before. He recalled how ungracious Van Kleeck had been one time when he had offered to help him with an intricate piece of figuring.

The problem now was to play on his weakness, to keep him so preoccupied that he would not remember the peril-laden push button. He must be caused to center the venom of his twisted outlook on Gaines, to the exclusion of every other thought.

But he must not goad him too carelessly, or a shot from across the room might put an end to Gaines, and to any chance of avoiding a bloody, wasteful struggle for control of the road.

GAINES chuckled. "Van," he said, "you are a pathetic little shrimp. That was a dead giveaway. I understand you perfectly—you're a third-rater, Van, and all your life you've been afraid that someone would see through you, and send you back to the foot of the class. Director—*pfui!* If you are the best the Functionalists can offer, we can afford to ignore them—they'll fold up from their own rotten inefficiency." He swung around in his chair, deliberately turning his back on Van Kleeck and his gun.

Van Kleeck advanced on his tormentor, halted a few feet away, and shouted: "You . . . I'll show you . . . I'll put a bullet in you; that's what I'll do!"

Gaines swung back around, got up, and walked steadily toward him. "Put that popgun down before you hurt yourself."

Van Kleeck retreated a step. "Don't you come near me!" he screamed. "Don't you come near me . . . or I'll shoot you . . . see if I don't!"

"This is it," thought Gaines, and dived.

The pistol went off alongside his ear. Well, that one didn't get him. They were on the floor. Van Kleeck was hard to hold, for a little man.

Where was the gun? There! He had it. He broke away.

Van Kleeck did not get up. He lay sprawled on the floor, tears streaming out of his closed eyes, blubbing like a frustrated child.

Gaines looked at him with something like compassion in his eyes, and hit him carefully behind the ear with the butt of the pistol. He walked over to the door, and listened for a moment, then locked it cautiously.

The cord from the push button led to the control board. He examined the hookup, and disconnected it carefully. That done, he turned to the televisor at the control desk, and called Fresno.

"O.K., Dave," he said, "let 'em attack now—and for the love of Pete, hurry!" Then he cleared the screen, not wishing his watch officer to see how he was shaking.

BACK in Fresno the next morning Gaines paced around the main control room with a fair degree of contentment in his heart. The roads were rolling—before

long they would be up to speed again. It had been a long night. Every engineer, every available cadet, had been needed to make the inch-by-inch inspection of Sacramento Sector which he had required. Then they had to cross-connect around two wrecked subsector control boards. But the roads were rolling—he could feel their rhythm up through the floor.

He stopped beside a haggard, stubbly-bearded man. “Why don’t you go home, Dave?” he asked. “McPherson can carry on from here.”

“How about yourself, chief? You don’t look like a June bride.”

“Oh, I’ll catch a nap in my office after a bit. I called my wife, and told her I couldn’t make it. She’s coming down here to meet me.”

“Was she sore?”

“Not very. You know how women are.” He turned back to the instrument board, and watched the clicking busybodies assembling the data from six sectors. San Diego Circle, Angeles Sector, Bakersfield Sector, Fresno Sector, Stockton—Stockton? Stockton! Good grief—Blekinsop! He had left a cabinet minister of Australia cooling his heels in the Stockton office all night long!

He started for the door, while calling over his shoulder: “Dave, will you order a car for me? Make it a fast one!” He was across the hall, and had his head inside his private office before Davidson could acknowledge the order.

“Dolores!”

“Yes, Mr. Gaines.”

“Call my wife, and tell her I had to go to Stockton. If she’s already left home, just have her wait here. And, Dolores—”

“Yes, Mr. Gaines?”

“Calm her down.”

She bit her lip, but her face was impassive. “Yes, Mr. Gaines.”

“That’s a good girl.” He was out and started down the stairway. When he reached road level, the sight of the rolling strips warmed him inside and made him feel almost cheerful.

He strode briskly way toward a door marked, “Access Down,” whistling softly to himself. He opened the door, and the rumbling, roaring rhythm from down inside seemed to pick up the tune even as it drowned out the sound of his whistling.

“Hie! Hie! Hee!

The rotor men are we—

Check off your sectors loud and strong!

ONE! TWO! THREE!

Anywhere you go

You are bound to know

That your roadways go rolling along!”

LIFE-LINE

THE chairman rapped loudly for order. Gradually the catcalls and boos died away as several self-appointed sergeant-at-arms persuaded a few hot-headed individuals to sit down. The speaker on the rostrum by the chairman seemed unaware of the disturbance. His bland, faintly insolent face was impassive. The chairman turned to the speaker and addressed him in a voice in which anger and annoyance were barely restrained.

“Dr. Pinero”—the “Doctor” was faintly stressed—“I must apologize to you for the unseemly outburst during your remarks. I am surprised that my colleagues

should so far forget the dignity proper to men of science as to interrupt a speaker, no matter”—he paused and set his mouth—“no matter how great the provocation.” Pinero smiled in his face, a smile that was in some way an open insult. The chairman visibly controlled his temper and continued: “I am anxious that the program be concluded decently and in order. I want you to finish your remarks. Nevertheless, I must ask you to refrain from affronting our intelligence with ideas that any educated man knows to be fallacious. Please confine yourself to your discovery—if you have made one.”

Pinero spread his fat, white hands, palms down. “How can I possibly put a new idea into your heads, if I do not first remove your delusions?”

The audience stirred and muttered. Someone shouted from the rear of the hall: “Throw the charlatan out! We’ve had enough.”

The chairman pounded his gavel. “Gentlemen! Please!”

Then to Pinero, “Must I remind you that you are not a member of this body, and that we did not invite you?”

Pinero’s eyebrows lifted. “So? I seem to remember an invitation on the letterhead of the Academy.”

The chairman chewed his lower lip before replying. “True. I wrote that invitation myself. But it was at the request of one of the trustees—a fine, public-spirited gentleman, but not a scientist, not a member of the Academy.” Pinero smiled his irritating smile. “So? I should have guessed. Old Bidwell, not so, of Amalgamated Life Insurance? And he wanted his trained seals to expose me as a fraud, yes? For if I can tell a man the day of his own death, no one will buy his pretty policies. But how can you expose me, if you will not listen to me first? Even supposing you had the wit to understand me? Bah! He has sent jackals to tear down a lion.” He deliberately turned his back on them.

The muttering of the crowd swelled and took on a vicious tone. The chairman cried vainly for order. There arose a figure in the front row.

“Mr. Chairman!”

The chairman grasped the opening and shouted: “Gentlemen! Dr. van Rhein Smitt has the floor.” The commotion died away.

The doctor cleared his throat, smoothed the forelock of his beautiful white hair, and thrust one hand into a side pocket of his smartly tailored trousers. He assumed his women’s-club manner.

“Mr. Chairman, fellow members of the Academy of Science, let us have tolerance. Even a murderer has the right to say his say before the State exacts its tribute. Shall we do less? Even though one may be intellectually certain of the verdict? I grant Dr. Pinero every consideration that should be given by this august body to any unaffiliated colleague, even though”—he bowed slightly in Pinero’s direction—“we may not be familiar with the university which bestowed his degree. If what he has to say is false, it cannot harm us. If what he has to say is true, we should know it.” His mellow, cultivated voice rolled on, soothing and calming. “If the eminent doctor’s manner appears a trifle inurbane of our tastes, we must bear in mind that the doctor may be from a place, or a stratum, not so meticulous in these matters. Now our good friend and benefactor has asked us to hear this person and carefully assess the merit of his claims. Let us do so with dignity and decorum.”

He sat down to a rumble of applause, comfortably aware that he had enhanced his reputation as an intellectual leader. Tomorrow the papers would again mention the good sense and persuasive personality of “America’s Handsomest University President.” Who knows; maybe now old Bidwell would come through with that swimming-pool donation.

WHEN the applause had ceased, the chairman turned to where the center of the disturbance sat, hands folded over his little round belly, face serene.

"Will you continue, Dr. Pinero?"

"Why should I?"

The chairman shrugged his shoulders, "You came for that purpose."

Pinero arose. "So true. So very true. But was I wise to come? Is there anyone here who has an open mind, who can stare a bare fact in the face without blushing? I think not. Even that so-beautiful gentleman who asked you to hear me out has already judged me and condemned me. He seeks order, not truth. Suppose truth defies order, will he accept it? Will you? I think not. Still, if I do not speak, you will win your point by default. The little man in the street will think that you little men have exposed me, Pinero, as a hoaxer, a pretender.

"I will repeat my discovery. In simple language, I have invented a technique to tell how long a man will live. I can give you advance billing of the Angel of Death. I can tell you when the Black Camel will kneel at your door. In five minutes' time, with my apparatus, I can tell any of you how many grains of sand are still left in your hourglass." He paused and folded his arms across his chest. For a moment no one spoke. The audience grew restless.

Finally the chairman intervened. "You aren't finished, Dr. Pinero?"

"What more is there to say?"

"You haven't told us how your discovery works."

Pinero's eyebrows shot up. "You suggest that I should turn over the fruits of my work for children to play with? This is dangerous knowledge, my friend. I keep it for the man who understands it, myself." He tapped his chest.

"How are we to know that you have anything back of your wild claims?"

"So simple. You send a committee to watch me demonstrate. If it works, fine. You admit it and tell the world so. If it does not work, I am discredited, and will apologize. Even I, Pinero, will apologize."

A slender, stoop-shouldered, man stood up in the back of the hall. The chair recognized him and he spoke.

"Mr. Chairman, how can the eminent doctor seriously propose such a course? Does he expect us to wait around for twenty or thirty years for someone to die and prove his claims?"

Pinero ignored the chair and answered directly.

"*Pfui!* Such nonsense! Are you so ignorant of statistics that you do not know that in any large group there is at least one who will die in the immediate future? I make you a proposition. Let me test each one of you in this room, and I will name the man who will die within the fortnight, yes, and the day and hour of his death." He glanced fiercely around the room. "Do you accept?"

Another figure got to his feet, a portly man who spoke in measured syllables. "I, for one, cannot countenance such an experiment. As a medical man, I have noted with sorrow the plain marks of serious heart trouble in many of our elder colleagues. If Dr. Pinero knows those symptoms, as he may, and were he to select as his victim one of their number, the man so selected would be likely to die on schedule, whether the distinguished speaker's mechanical egg timer works or not."

Another speaker backed him up at once. "Dr. Shepard is right. Why should we waste time on voodoo tricks? It is my belief that this person who calls himself *Dr. Pinero* wants to use this body to give his statements authority. If we participate in this farce, we play into his hands. I don't know what his racket is, but you can bet that he has figured out some way to use us for advertising his schemes. I move, Mr. Chairman, that we proceed with our regular business."

The motion carried by acclamation, but Pinero did not sit down. Amidst cries of "Order! Order!" he shook his untidy head at them, and had his say.

“Barbarians! Imbeciles! Stupid dolts! Your kind have blocked the recognition of every great discovery since time began. Such ignorant canaille are enough to start Galileo spinning in his grave. That fat fool down there twiddling his elk’s tooth calls himself a medical man. Witch doctor would be a better term! That little bald-headed runt over there—You! You style yourself a philosopher, and prate about life and time in your neat categories. What do you know of either one? How can you ever learn when you won’t examine the truth when you have a chance? Bah!” He spat upon the stage. “You call this an Academy of Science. I call it an undertakers’ convention, interested only in embalming the ideas of your red-blooded predecessors.”

He paused for breath and was grasped on each side by two members of the platform committee and rushed out the wings. Several reporters arose hastily from the press table and followed him. The chairman declared the meeting adjourned.

THE NEWSPAPERMEN caught up with Pinero as he was going out by the stage door. He walked with a light, springy step, and whistled a little tune. There was no trace of the belligerence he had shown a moment before. They crowded about him. “How about an interview, doc?”

“What d’yuh think of modern education?”

“You certainly told ’em. What are your views on life after death?”

“Take off your hat, doc, and look at the birdie.”

He grinned at them all. “One at a time, boys, and not so fast. I used to be a newspaperman myself. How about coming up to my place?”

A few minutes later they were trying to find places to sit down in Pinero’s messy bed-living room, and lighting his cigars. Pinero looked around and beamed. “What’ll it be, boys? Scotch or Bourbon?” When that was taken care of he got down to business. “Now, boys, what do you want to know?”

“Lay it on the line, doc. Have you got something, or haven’t you?”

“Most assuredly I have something, my young friend.”

“Then tell us how it works. That guff you handed the profs won’t get you anywhere now.”

“Please, my dear fellow. It is my invention. I expect to make some money with it. Would you have me give it away to the first person who asks for it?”

“See here, doc, you’ve got to give us something if you expect to get a break in the morning papers. What do you use? A crystal ball?”

“No, not quite. Would you like to see my apparatus?”

“Sure. Now we’re getting somewhere.”

He ushered them into an adjoining room, and waved his hand. “There it is, boys.” The mass of equipment that met their eyes vaguely resembled a medico’s office X-ray gear. Beyond the obvious fact that it used electrical power, and that some of the dials were calibrated in familiar terms, a casual inspection gave no clue to its actual use.

“What’s the principle, doc?”

Pinero pursed his lips and considered. “No doubt you are all familiar with the truism that life is electrical in nature. Well, that truism isn’t worth a damn, but it will help to give you an idea of the principle. You have also been told that time is a fourth dimension. Maybe you believe it, perhaps not. It has been said so many times that it has ceased to have any meaning. It is simply a cliché that windbags use to impress fools. But I want you to try to visualize it now, and try to feel it emotionally.”

He stepped up to one of the reporters. “Suppose we take you as an example. Your name is Rogers, is it not? Very well, Rogers, you are a space-time event

having duration four ways. You are not quite six feet tall, you are about twenty inches wide and perhaps ten inches thick. In time, there stretches behind you more of this space-time event, reaching to, perhaps, 1905, of which we see a cross section here at right angles to the time axis, and as thick as the present. At the far end is a baby, smelling of sour milk and drooling its breakfast on its bib. At the other end lies, perhaps, an old man some place in the 1980s. Imagine this space-time event, which we call Rogers, as a long pink worm, continuous through the years. It stretches past us here in 1939, and the cross section we see appears as a single, discreet body. But that is illusion. There is physical continuity to this pink worm, enduring through the years. As a matter of fact, there is physical continuity in this concept to the entire race, for these pink worms branch off from other pink worms. In this fashion the race is like a vine whose branches intertwine and send out shoots. Only by taking a cross section of the vine would we fall into the error of believing that the shootlets were discreet individuals.”

He paused and looked around at their faces. One of them, a dour, hard-bitten chap, put in a word.

“That’s all very pretty, Pinero, if true, but where does that get you?”

PINERO favored him with an unresentful smile. “Patience, my friend. I asked you to think of life as electrical. Now think of our long, pink worm as a conductor of electricity. You have heard, perhaps, of the fact that electrical engineers can, by certain measurements, predict the exact location of a break in a transatlantic cable without ever leaving the shore. I do the same with our pink worms. By applying my instruments to the cross section here in this room I can tell where the break occurs; that is to say, where death takes place. Or, if you like, I can reverse the connections and tell you the date of your birth. But that is uninteresting; you already know it.”

The dour individual sneered. “I’ve caught you, doc. If what you say about the race being like a vine of pink worms is true, you can’t tell birthdays, because the connection with the race is continuous at birth. Your electrical conductor reaches on back through the mother into a man’s remotest ancestors.”

Pinero beamed. “True, and clever, my friend. But you have pushed the analogy too far. It is not done in the precise manner in which one measures the length of an electrical conductor. In some ways it is more like measuring the length of a long corridor by bouncing an echo off the far end. At birth there is a sort of twist in the corridor, and, by proper calibration, I can detect the echo from that twist.”

“Let’s see you prove it.”

“Certainly, my dear friend. Will you be a subject?”

One of the others spoke up. “He’s called your bluff, Luke. Put up or shut up.”

“I’m game. What do I do?”

“First write the date of your birth on a sheet of paper, and hand it to one of your colleagues.”

Luke complied. “Now what?”

“Remove your outer clothing and step upon these scales. Now tell me, were you ever very much thinner, or very much fatter, than you are now? No? What did you weigh at birth? Ten pounds? A fine bouncing baby boy. They don’t come so big any more.”

“What is all this flubdubbery?”

“I am trying to approximate the average cross section of our long pink conductor, my dear Luke. Now will you seat yourself here? Then place this electrode in your mouth. No, it will not hurt you; the voltage is quite low, less

than one micro-volt, but I must have a good connection.” The doctor left him and went behind his apparatus, where he lowered a hood over his head before touching his controls. Some of the exposed dials came to life and a low humming came from the machine. It stopped and the doctor popped out of his little hide-away.

“I get sometime in February, 1902. Who has the piece of paper with the date?”

It was produced and unfolded. The custodian read, “February 22, 1902.” The stillness that followed was broken by a voice from the edge of the little group. “Doc, can I have another drink?”

The tension relaxed, and several spoke at once: “Try it on me, doc.”

“Me first, doc; I’m an orphan and really want to know.”

“How about it, doc? Give us all a little loose play.” He smilingly complied, ducking in and out of the hood like a gopher from its hole. When they all had twin slips of paper to prove the doctor’s skill, Luke broke a long silence.

“How about showing how you predict death, Pinero?”

“If you wish. Who will try it?”

No one answered. Several of them nudged Luke forward. “Go ahead, smart guy. You asked for it.” He allowed himself to be seated in the chair. Pinero changed some of the switches, then entered the hood. When the humming ceased he came out, rubbing his hands briskly together.

“Well, that’s all there is to see, boys. Got enough for a story?”

“Hey, what about the prediction? When does Luke get his ‘Thirty’ ?” Luke faced him. “Yes, how about it?” Pinero looked pained. “Gentlemen, I am surprised at you. I give that information for a fee. Besides, it is a professional confidence. I never tell anyone but the client who consults me.”

“I don’t mind. Go ahead and tell them.”

“I am very sorry. I really must refuse. I only agreed to show you how; not to give the results.”

Luke ground the butt of his cigarette into the floor. “It’s a hoax, boys. He probably looked up the age of every reporter in town just to be ready to pull this. It won’t wash, Pinero.” Pinero gazed at him sadly. “Are you married, my friend?”

“No.”

“Do you have anyone dependent on you? Any close relatives?”

“No. Why? Do you want to adopt me?”

Pinero shook his head. “I am very sorry for you, my dear Luke. You will die before tomorrow.”

DEATH PUNCHES TIME CLOCK

. . . within twenty minutes of Pinero’s strange prediction, Timons was struck by a falling sign while walking down Broadway toward the offices of the *Daily Herald* where he was employed.

Dr. Pinero declined to comment but confirmed the story that he had predicted Timons’ death by means of his so-called chronovitameter. Chief of Police Roy . . .

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Legal Notice

To whom it may concern, greetings; I, John Cabot Winthrop III, of the firm of Winthrop, Winthrop, Ditmars and Winthrop, Attorneys-at-law, do affirm that Hugo Pinero of this city did hand to me ten thousand dollars in lawful money of the United States, and did instruct me to place it in escrow with a chartered bank of my selection with escrow instructions as follows:

The entire bond shall be forfeit, and shall forthwith be paid to the first client of Hugo Pinero and/or Sands of Time, Inc. who shall exceed his life tenure as predicted by Hugo Pinero by one per centum, or to the estate of the first client who shall fail of such predicted tenure in a like amount, whichever occurs first in point of time.

Subscribed and sworn,
John Cabot Winthrop III.

Subscribed and sworn to before
me this 2nd day of April, 1939.
Albert M. Swanson
Notary Public in and for this
county and State. My commission
expires June 17, 1939.

“Good evening, Mr. and Mrs. Radio Audience, let’s go to press! Flash! Hugo Pinero, the Miracle Man from Nowhere, has made his thousandth death prediction without anyone claiming the reward he offered to the first person who catches him failing to call the turn. With thirteen of his clients already dead, it is mathematically certain that he has a private line to the main office of the Old Man with the Scythe. That is one piece of news I don’t want to know about before it happens. Your coast-to-coast correspondent will *not* be a client of Prophet Pinero—”

THE judge’s watery baritone cut through the stale air of the courtroom. “Please, Mr. Weems, let us return to our subject. This court granted your prayer for a temporary restraining order, and now you ask that it be made permanent. In rebuttal, Dr. Pinero claims that you have presented no cause and asks that the injunction be lifted, and that I order your client to cease from attempts to interfere with what Pinero describes as a simple, lawful business. As you are not addressing a jury, please omit the rhetoric and tell me in plain language why I should not grant his prayer.”

Mr. Weems jerked his chin nervously, making his flabby gray dewlap drag across his high stiff collar, and resumed:

“May it please the honorable court, I represent the public—”

“Just a moment. I thought you were appearing for Amalgamated Life Insurance.”

“I am, your honor, in a formal sense. In a wider sense I represent several other of the major assurance, fiduciary and financial institutions, their stockholders and policy holders, who constitute a majority of the citizenry. In addition we feel that we protect the interests of the entire population, unorganized, inarticulate and otherwise unprotected.”

“I thought that I represented the public,” observed the judge dryly. “I am afraid I must regard you as appearing for your client of record. But continue. What is your thesis?”

The elderly barrister attempted to swallow his Adam’s apple, then began again: “Your honor, we contend that there are two separate reasons why this injunction should be made permanent, and, further, that each reason is sufficient alone.

“In the first place, this person is engaged in the practice of soothsaying, an occupation proscribed both in common law and statute. He is a common fortuneteller, a vagabond charlatan who preys on the gullibility of the public. He is cleverer than the ordinary gypsy palm reader, astrologer or table tipper, and to the same extent more dangerous. He makes false claims of modern scientific methods to give a spurious dignity to the thaumaturgy. We have here in court leading representatives of the Academy of Science to give expert witness as to the absurdity of his claims.

“In the second place, even if this person’s claims were true—granting for the sake of argument such an absurdity”—Mr. Weems permitted himself a thin-lipped smile—“we contend that his activities are contrary to the public interest in general, and unlawfully injurious to the interests of my client in particular. We are prepared to produce numerous exhibits with the legal custodians to prove that this person did publish, or cause to have published, utterances urging the public to dispense with the priceless boon of life insurance to the great detriment of their welfare and to the financial damage of my client.”

Pinero arose in his place. “Your honor, may I say a few words?”

“What is it?”

“I believe I can simplify the situation if permitted to make a brief analysis.”

“Your honor,” put in Weems, “this is most irregular.”

“PATIENCE, Mr. Weems. Your interests will be protected. It seems to me that we need more light and less noise in this matter. If Dr. Pinero can shorten the proceedings by speaking at this time, I am inclined to let him. Proceed, Dr. Pinero.”

“Thank you, your honor. Taking the last of Mr. Weems’ points first, I am prepared to stipulate that I published the utterances he speaks of—”

“One moment, doctor. You have chosen to act as your own attorney. Are you sure you are competent to protect your own interests?”

“I am prepared to chance it, your honor. Our friends here can easily prove what I stipulate.”

“Very well. You may proceed.”

“I will stipulate that many persons have canceled life-insurance policies as a result thereof, but I challenge them to show that anyone so doing has suffered any loss or damage therefrom. It is true that the Amalgamated has lost business through my activities, but that is the natural result of my discovery, which has made their policies as obsolete as the bow and arrow. If an injunction is granted on that ground, I shall set up a coal-oil-lamp factory, and then ask for an injunction against the Edison and General Electric companies to forbid them to manufacture incandescent bulbs.

“I will stipulate that I am engaged in the business of making predictions of death, but I deny that I am practicing magic, black, white or rainbow-colored. If to make predictions by methods of scientific accuracy is illegal, then the actuaries of the Amalgamated have been guilty for years, in that they predict the exact percentage that will die each year in any given large group. I predict death retail; the Amalgamated predicts it wholesale. If their actions are legal, how can mine be illegal?”

“I admit that it makes a difference whether I can do what I claim, or not; and I will stipulate that the so-called expert witnesses from the Academy of Science will testify that I cannot. But they know nothing of my method and cannot give truly expert testimony on it—”

“Just a moment, doctor. Mr. Weems, is it true that your expert witnesses are not conversant with Dr. Pinero’s theory and methods?”

Mr. Weems looked worried. He drummed on the table top, then answered, "Will the court grant me a few moments' indulgence?"

"Certainly."

Mr. Weems held a hurried whispered consultation with his cohorts, then faced the bench. "We have a procedure to suggest, your honor. If Dr. Pinero will take the stand and explain the theory and practice of his alleged method, then these distinguished scientists will be able to advise the court as to the validity of his claims."

THE JUDGE looked inquiringly at Pinero, who responded: "I will not willingly agree to that. Whether my process is true or false, it would be dangerous to let it fall into the hands of fools and quacks"—he waved his hand at the group of professors seated in the front row, paused and smiled maliciously—"as these gentlemen know quite well. Furthermore, it is not necessary to know the process in order to prove that it will work. Is it necessary to understand the complex miracle of biological reproduction in order to observe that a hen lays eggs? Is it necessary for me to re-educate this entire body of self-appointed custodians of wisdom—cure them of their ingrown superstitions—in order to prove that my predictions are correct?"

"There are but two ways of forming an opinion in science. One is the scientific method; the other, the scholastic. One can judge from experiment, or one can blindly accept authority. To the scientific mind, experimental proof is all-important, and theory is merely a convenience in description, to be junked when it no longer fits. To the academic mind, authority is everything, and facts are junked when they do not fit theory laid down by authority.

"It is this point of view—academic minds clinging like oysters to disproved theories—that has blocked every advance of knowledge in history. I am prepared to prove my method by experiment, and, like Galileo in another court, I insist, It still moves!"

"Once before I offered such proof to this same body of self-styled experts, and they rejected it. I renew my offer; let me measure the life length of the members of the Academy of Science. Let them appoint a committee to judge the results. I will seal my findings in two sets of envelopes; on the outside of each envelope in one set will appear the name of a member; on the inside, the date of his death. In the other envelopes I will place names; on the outside I will place dates. Let the committee place the envelopes in a vault, then meet from time to time to open the appropriate envelopes. In such a large body of men some deaths may be expected, if Amalgamated actuaries can be trusted, every week or two. In such a fashion they will accumulate data very rapidly to prove that Pinero is a liar, or no."

He stopped, and thrust out his chest until it almost caught up with his little round belly. He glared at the sweating savants. "Well?"

The judge raised his eyebrows, and caught Mr. Weems' eye. "Do you accept?"

"Your honor, I think the proposal highly improper—"

The judge cut him short. "I warn you that I shall rule against you if you do not accept, or propose an equally reasonable method of arriving at the truth."

Weems opened his mouth, changed his mind, looked up and down the faces of the learned witnesses, and faced the bench. "We accept, your honor."

"Very well. Arrange the details between you. The temporary injunction is lifted, and Dr. Pinero must not be molested in the pursuit of his business. Decision on the petition for permanent injunction is reserved without prejudice pending the accumulation of evidence. Before we leave this matter I wish to comment on the theory implied by you, Mr. Weems, when you claimed damage

to your client. There was grown up in the minds of certain groups in this country the notion that because a man or corporation has made a profit out of the public for a number of years, the government and the courts are charged with the duty of guaranteeing such profit in the future, even in the face of changing circumstances and contrary to public interest. This strange doctrine is not supported by statute nor common law. Neither individuals nor corporations have any right to come into court and ask that the clock of history be stopped, or turned back.”

BIDWELL grunted in annoyance. “Weems, if you can’t think up anything better than that, Amalgamated is going to need a new chief attorney. It’s been ten weeks since you lost the injunction, and that little wart is coining money hand over fist. Meantime, every insurance firm in the country’s going broke. Hoskins, what’s our loss ratio?”

“It’s hard to say, Mr. Bidwell. It gets worse every day. We’ve paid off thirteen big policies this week; all of them taken out since Pinero started operations.”

A spare little man spoke up. “I say, Bidwell, we aren’t accepting any new applicants for United, until we have time to check and be sure that they have not consulted Pinero. Can’t we afford to wait until the scientists show him up?”

Bidwell snorted. “You blasted optimist! They won’t show him up. Aldrich, can’t you face a fact? The fat little pest has something; how, I don’t know. This is a fight to the finish. If we wait, we’re licked.” He threw his cigar into a cuspidor, and bit savagely into a fresh one. “Clear out of here, all of you! I’ll handle this my own way. You, too, Aldrich. United may wait, but Amalgamated won’t.”

Weems cleared his throat apprehensively. “Mr. Bidwell, I trust you will consult me before embarking on any major change in policy?”

Bidwell grunted. They filed out. When they were all gone and the door closed, Bidwell snapped the switch of the interoffice announcer. “O.K.; send him in.”

The outer door opened. A slight, dapper figure stood for a moment at the threshold. His small, dark eyes glanced quickly about the room before he entered, then he moved up to Bidwell with a quick, soft tread. He spoke to Bidwell in a flat, emotionless voice. His face remained impassive except for the live, animal eyes. “You wanted to talk to me?”

“Yes.”

“What’s the proposition?”

“Sit down, and we’ll talk.”

PINERO met the young couple at the door of his inner office.

“Come in, my dears, come in. Sit down. Make yourselves at home. Now tell me, what do you want of Pinero? Surely such young people are not anxious about the final roll call?”

The boy’s pleasant young face showed slight confusion. “Well, you see, Dr. Pinero, I’m Ed Hartley and this is my wife, Betty. We’re going to have . . . that is, Betty is expecting a baby and, well—”

Pinero smiled benignly. “I understand. You want to know how long you will live in order to make the best possible provision for the youngster. Quite wise. Do you both want readings, or just yourself?”

The girl answered, “Both of us, we think.”

Pinero beamed at her. “Quite so. I agree. Your reading presents certain technical difficulties at this time, but I can give you some information now. Now come into my laboratory, my dears, and we’ll commence.”

He rang for their case histories, then showed them into his workshop. "Mrs. Hartley first, please. If you will go behind that screen and remove your shoes and your outer clothing, please."

He turned away and made some minor adjustments of his apparatus. Ed nodded to his wife, who slipped behind the screen and reappeared almost at once, dressed in a slip. Pintero glanced up.

"This way, my dear. First we must weigh you. There. Now take your place on the stand. This electrode in your mouth. No, Ed, you mustn't touch her while she is in the circuit. It won't take a minute. Remain quiet."

He dove under the machine's hood and the dials sprang into life. Very shortly he came out, with a perturbed look on his face. "Ed, did you touch her?"

"No, doctor." Pintero ducked back again and remained a little longer. When he came out this time, he told the girl to get down and dress. He turned to her husband.

"Ed, make yourself ready."

"What's Betty's reading, doctor?"

"There is a little difficulty. I want to test you first."

When he came out from taking the youth's reading, his face was more troubled than ever. Ed inquired as to his trouble. Pintero shrugged his shoulders and brought a smile to his lips.

"Nothing to concern you, my boy. A little mechanical misadjustment, I think. But I shan't be able to give you two your readings today. I shall need to overhaul my machine. Can you come back tomorrow?"

"Why, I think so. Say, I'm sorry about your machine. I hope it isn't serious."

"It isn't, I'm sure. Will you come back into my office and visit for a bit?"

"Thank you, doctor. You are very kind."

"But, Ed, I've got to meet Ellen."

Pintero turned the full force of his personality on her. "Won't you grant me a few moments, my dear young lady? I am old, and like the sparkle of young folks' company. I get very little of it. Please." He nudged them gently into his office and seated them. Then he ordered lemonade and cookies sent in, offered them cigarettes and lit a cigar.

Forty minutes later Ed listened entranced, while Betty was quite evidently acutely nervous and anxious to leave, as the doctor spun out a story concerning his adventures as a young man in Terra del Fuego. When the doctor stopped to relight his cigar, she stood up.

"Doctor, we really must leave.

Couldn't we hear the rest tomorrow?"

"Tomorrow? There will not be time tomorrow."

"But you haven't time today, either. Your secretary has rung five times."

"Couldn't you spare me just a few more minutes?"

"I really can't today, doctor. I have an appointment. There is someone waiting for me."

"There is no way to induce you?"

"I'm afraid not. Come, Ed."

After they had gone, the doctor stepped to the window and stared out over the city. Presently he picked out two tiny figures as they left the office building. He watched them hurry to the corner, wait for the lights to change, then start across the street. When they were part way across, there came the scream of a siren. The two little figures hesitated, started back, stopped and turned. Then the car was upon them. As the car slammed to a stop, they showed up from beneath it, no longer two figures, but simply a limp, unorganized heap of clothing.

Presently the doctor turned away from the window. Then he picked up his phone and spoke to his secretary.

"Cancel my appointments for the rest of the day . . . No . . . No one . . . I don't care; cancel them."

Then he sat down in his chair. His cigar went out. Long after dark he held it, still unlighted.

PINERO sat down at his dining table and contemplated the gourmet's luncheon spread before him. He had ordered this meal with particular care, and had come home a little early in order to enjoy it fully.

Somewhat later he let a few drops of fiori d'Alpini roll around his tongue and trickle down his throat. The heavy, fragrant sirup warmed his mouth and reminded him of the little mountain flowers for which it was named. He sighed. It had been a good meal, an exquisite meal and had justified the exotic liqueur.

His musing was interrupted by a disturbance at the front door. The voice of his elderly maidservant was raised in remonstrance. A heavy male voice interrupted her. The commotion moved down the hall and the dining-room door was pushed open.

"Mia Madonna! Non si puo entrare! The master is eating!"

"Never mind, Angela. I have time to see these gentlemen. You may go."

Pinero faced the surly-faced spokesman of the intruders. "You have business with me; yes?"

"You bet we have. Decent people have had enough of your damned nonsense."

"And so?"

The caller did not answer at once. A smaller, dapper individual moved out from behind him and faced Pinero.

"WE might as well begin." The chairman of the committee placed a key in the lock box and opened it. "Wenzell, will you help me pick out today's envelopes?" He was interrupted by a touch on his arm.

"Dr. Baird, you are wanted on the telephone."

"Very well. Bring the instrument here."

When it was fetched he placed the receiver to his ear. "Hello . . . Yes; speaking . . . What? . . . No, we have heard nothing . . . Destroyed the machine, you say . . . Dead! How? . . . No! No statement. None at all . . . Call me later."

He slammed the instrument down and pushed it from him.

"What's up?"

"Who's dead now?"

Baird held up one hand. "Quiet, gentlemen, please! Pinero was murdered a few moments ago at his home."

"Murdered!"

"That isn't all. About the same time vandals broke into his office and smashed his apparatus."

No one spoke at first. The committee members glanced around at each other. No one seemed anxious to be the first to comment.

Finally one spoke up. "Get it out."

"Get what out?"

"Pinero's envelope. It's in there, too. I've seen it."

Baird located it, and slowly tore it open. He unfolded the single sheet of paper and scanned it.

"Well? Out with it!"

“One thirteen p.m . . . today.” They took this in silence.

Their dynamic calm was broken by a member across the table from Baird reaching for the lock box. Baird interposed a hand.

“What do you want?”

“My prediction. It’s in there—we’re all in there.”

“Yes, yes.”

“We’re all in there.”

“Let’s have them.”

Baird placed both hands over the box. He held the eye of the man opposite him, but did not speak. He licked his lips. The corner of his mouth twitched. His hands shook. Still he did not speak. The man opposite relaxed back into his chair.

“You’re right, of course,” he said. “Bring me that wastebasket.” Baird’s voice was low and strained, but steady.

He accepted it and dumped the litter on the rug. He placed the tin basket on the table before him. He tore half a dozen envelopes across, set a match to them, and dropped them in the basket. Then he started tearing a double handful at a time, and fed the fire steadily. The smoke made him cough, and tears ran out of his smarting eyes. Someone got up and opened a window. When Baird was through, he pushed the basket away from him, looked down and spoke.

“I’m afraid I’ve ruined this table top.”

BLOWUPS HAPPEN

“PUT down that wrench!”

The man addressed turned slowly around and faced the speaker. His expression was hidden by a grotesque helmet, part of a heavy, leaden armor which shielded his entire body, but the tone of voice in which he answered showed nervous exasperation.

“What the hell’s eating on you, doc?” He made no move to replace the tool in question.

They faced each other like two helmeted, arrayed fencers, watching for an opening. The first speaker’s voice came from behind his mask a shade higher in key and more peremptory in tone. “You heard me, Harper. Put down that wrench at once, and come away from that ‘trigger.’ Erickson!”

A third armored figure came around the shield which separated the uranium bomb proper from the control room in which the first two stood. “Whatcha want, doc?”

“Harper is relieved from watch. You take over as engineer-of-the-watch. Send for the stand-by engineer.”

“Very well.” His voice and manner were phlegmatic, as he accepted the situation without comment. The atomic engineer, whom he had just relieved, glanced from one to the other, then carefully replaced the wrench in its rack.

“Just as you say, Dr. Silard—but send for your relief, too. I shall demand an immediate hearing!” Harper swept indignantly out, his lead-sheathed boots clumping on the floor plates.

Dr. Silard waited unhappily for the ensuing twenty minutes until his own relief arrived. Perhaps he had been hasty. Maybe he was wrong in thinking that Harper had at last broken under the strain of tending the most dangerous machine in the world—an atomic power plant. But if he had made a mistake, it had to be on the safe side—slips *must not happen* in this business; not when a slip might result in the atomic detonation of two and a half tons of uranium.

He tried to visualize what that would mean, and failed. He had been told that uranium was potentially forty million times as explosive as TNT. The figure was meaningless that way. He thought of it, instead, as a hundred million tons of high explosive, two hundred million aircraft bombs as big as the biggest ever used. It still did not mean anything. He had once seen such a bomb dropped, when he had been serving as a temperament analyst for army aircraft pilots. The bomb had left a hole big enough to bide an apartment house. He could not imagine the explosion of a thousand such bombs, much, much less a hundred million of them.

Perhaps these atomic engineers could. Perhaps, with their greater mathematical ability and closer comprehension of what actually went on inside the nuclear fission chamber—the “bomb”—they had some vivid glimpse of the mind-shattering horror locked up beyond that shield. If so, no wonder they tended to blow up—

He sighed. Erickson looked up from the linear resonant accelerator on which he had been making some adjustment. “What’s the trouble, doc?”

“Nothing. I’m sorry I had to relieve Harper.”

Silard could feel the shrewd glance of the big Scandinavian. “Not getting the jitters yourself, are you, doe? Sometimes you squirrel sleuths blow up, too—”

“Me? I don’t think so. I’m scared of that thing in there—I’d be crazy if I weren’t.”

“So am I,” Erickson told him soberly, and went back to his work.

THE ACCELERATOR’S snout disappeared in the shield, between them and the bomb, where it fed a steady stream of terrifically speeded up subatomic bullets to the beryllium target located within the bomb itself. The tortured beryllium yielded up neutrons, which shot out in all directions through the uranium mass. Some of these neutrons struck uranium atoms squarely on their nuclei and split them in two. The fragments were new elements, barium, xenon, rubidium—depending on the proportions in which each atom split. The new elements were usually unstable isotopes and broke down into a dozen more elements by radioactive disintegration in a progressive chain reaction.

But these chain reactions were comparatively unimportant; it was the original splitting of the uranium nucleus, with the release of the aweinspiring energy that bound it together—an incredible two hundred million electron-volts—that was important—and perilous.

For, while uranium isotope 235 may be split by bombarding it with neutrons from an outside source, the splitting itself gives up more neutrons which, in turn, may land in other uranium nuclei and split them. If conditions are favorable to a progressively increasing reaction of this sort, it may get out of hand, build up in an unmeasurable fraction of a micro-second into a complete atomic explosion—an explosion which would dwarf the eruption of Krakatoa to popgun size; an explosion so far beyond all human experience as to be as completely incomprehensible as the idea of personal death. It could be feared, but not understood.

But a self-perpetuating sequence of nuclear splitting, *just under the level of complete explosion*, was necessary to the operation of the power plant. To split the first uranium nucleus by bombarding it with neutrons from the beryllium target took more power than the death of the atom gave up. In order that the output of power from the system should exceed the power input in useful proportion it was imperative that each atom split by a neutron from the beryllium target should cause the splitting of many more.

It was equally imperative that this chain of reactions should always tend to dampen, to die out. It must not build up, or the entire mass would explode within a time interval too short to be measured by any means whatsoever.

Nor would there be anyone left to measure it.

THE atomic engineer on duty at the bomb could control this reaction by means of the "trigger," a term the engineers used to include the linear resonant accelerator, the beryllium target, and the adjacent controls, instrument board, and power sources. That is to say, he could vary the bombardment on the beryllium target to increase or decrease the power output of the plant, and he could tell from his instruments that the internal reaction was dampened—or, rather, that it had been dampened the split second before. He could not possibly know what was actually happening *now* within the bomb—subatomic speeds are too great and the time intervals too small. He was like the bird that flew backward; he could see where he had been, but he never knew where he was going.

Nevertheless, it was his responsibility, and his alone, not only to maintain the bomb at a high input-output efficiency, but to see that the reaction never passed the critical point and progressed into mass explosion.

But that was impossible. He could not be sure; he could never be sure.

He could bring to the job all of the skill and learning of the finest technical education, and use it to reduce the hazard to the lowest mathematical probability, but the blind laws of chance which appear to rule in subatomic action might turn up a royal flush against him and defeat his most skillful play.

And each atomic engineer knew it, knew that he gambled not only with his own life, but with the lives of countless others, perhaps with the lives of every human being on the planet. Nobody knew quite what such an explosion would do. The most conservative estimate assumed that, in addition to destroying the plant and its personnel completely, it would tear a chunk out of the populous and heavily traveled Los Angeles-Oklahoma Road City a hundred miles to the north.

That was the official, optimistic viewpoint on which the plant had been authorized, and based on mathematics which predicted that a mass of uranium would itself be disrupted on a molar scale, and thereby rendered comparatively harmless, before progressive and accelerated atomic explosion could infect the entire mass.

The atomic engineers, by and large, did not place faith in the official theory. They judged theoretical mathematical prediction for what it was worth—precisely nothing, until confirmed by experiment.

But even from the official viewpoint, each atomic engineer while on watch carried not only his own life in his hands, but the lives of many others—how many, it was better not to think about. No pilot, no general, no surgeon ever carried such a daily, inescapable, ever-present weight of responsibility for the lives of other people as these men carried every time they went on watch, every time they touched a vernier screw or read a dial.

They were selected not alone for their intelligence and technical training, but quite as much for their characters and sense of social responsibility. Sensitive men were needed—"men who could fully appreciate the importance of the charge intrusted to them; no other sort would do. But the burden of responsibility was too great to be borne indefinitely by a sensitive man.

It was, of necessity, a psychologically unstable condition. Insanity was an occupational disease.

DR. CUMMINGS appeared, still buckling the straps of the armor worn to guard against stray radiation. "What's up?" he asked Silard.

"I had to relieve Harper."

"So I guessed. I met him coming up. He was sore as hell—just glared at me."

"I know. He wants an immediate hearing. That's why I had to send for you."

Cummings grunted, then nodded toward the engineer, anonymous in all-including armor. "Who'd I draw?"

"Erickson."

"Good enough. Squareheads can't go crazy—eh, Gus?"

Erickson looked up momentarily and answered, "That's your problem," and returned to his work.

Cummings turned back to Silard and commented. "Psychiatrists don't seem very popular around here. O.K.—I relieve you, sir."

"Very well, sir."

Silard threaded his way through the zigzag in the tanks of water which surrounded the disintegration room. Once outside this outer shield, he divested himself of the cumbersome armor, disposed of it in the locker room provided, and hurried to a lift. He left the lift at the tube station, underground, and looked around for an unoccupied capsule. Finding one, he strapped himself in, sealed the gasketed door, and settled the back of his head into the rest against the expected surge of acceleration.

Five minutes later he knocked at the door of the office of the general superintendent, twenty miles away.

The power plant proper was located in a bowl of desert hills on the Arizona plateau. Everything not necessary to the immediate operation of the plant—administrative offices, television station and so forth—lay beyond the hills. The buildings housing these auxiliary functions were of the most durable construction technical ingenuity could devise. It was hoped that, if *der tag* ever came, occupants would stand approximately the chance of survival of a man going over Niagara Falls in a barrel.

Silard knocked again. He was greeted by a male secretary, Steinke. Silard recalled reading his case history. Formerly one of the most brilliant of the young engineers, he had suffered a blanking out of the ability to handle mathematical operations. A plain case of *fugue*, but there had been nothing that the poor devil could do about it—he had been anxious enough with his conscious mind to stay on duty. He had been rehabilitated as an office worker.

Steinke ushered him into the superintendent's private office. Harper was there before him, and returned his greeting with icy politeness. The superintendent was cordial, but Silard thought he looked tired, as if the twenty-four-hour-a-day strain was too much for him.

"Come in, doctor, come in. Sit down. Now tell me about this. I'm a little surprised. I thought Harper was one of my steadiest men."

"I don't say he isn't, sir."

"Well?"

"He may be perfectly all right, but your instructions to me are not to take any chances."

"Quite right." The superintendent gave the engineer, silent and tense in his chair, a troubled glance, then returned his attention to Silard. "Suppose you tell me about it."

SILARD took a deep breath. "While on watch as psychological observer at the control station I noticed that the engineer of the watch seemed preoccupied and less responsive to stimuli than usual. During my off-watch observation of this

case, over a period of the past several days, I have suspected an increasing lack of attention. For example, while playing contract bridge, he now occasionally asks for a review of the bidding, which is contrary to his former behavior pattern.

“Other similar data are available. To cut it short, at 3:11 today, while on watch, I saw Harper, with no apparent reasonable purpose in mind, pick up a wrench used only for operating the valves of the water shield and approach the trigger. I relieved him of duty and sent him out of the control room.”

“Chief!” Harper calmed himself somewhat and continued: “If this witch doctor knew a wrench from an oscillator, he’d known what I was doing. The wrench was on the wrong rack. I noticed it, and picked it up to return it to its proper place. On the way, I stopped to check the readings!”

The superintendent turned inquiringly to Dr. Silard.

“That may be true. Granting that it is true,” answered the psychiatrist doggedly, “my diagnosis still stands. Your behavior pattern has altered; your present actions are unpredictable, and I can’t approve you for responsible work without a complete check-up.”

General Superintendent King drummed on the desk top and sighed. Then he spoke slowly to Harper: “Cal, you’re a good boy, and, believe me, I know how you feel. But there is no way to avoid it—you’ve got to go up for the psychometrics, and accept whatever disposition the board makes of you.” He paused, but Harper maintained an expressionless silence. “Tell you what, son—why don’t you take a few days leave? Then, when you come back, you can go up before the board, or transfer to another department away from the bomb, whichever you prefer.” He looked to Silard for approval, and received a nod.

But Harper was not mollified. “No, chief,” he protested. “It won’t do. Can’t you see what’s wrong? It’s this constant supervision. Somebody always watching the back of your neck, *expecting* you to go crazy. A man can’t even shave in private. We’re jumpy about the most innocent acts, for fear some head doctor, half batty himself, will see it and decide it’s a sign we’re slipping. Good grief, what do you expect?” His outburst having run its course, he subsided into a flippant cynicism that did not quite jell. “O.K.—never mind the strait jacket; I’ll go quietly. You’re a good Joe in spite of it, chief,” he added, “and I’m glad to have worked under you. Good-by.” King kept the pain in his eyes out of his voice. “Wait a minute, Cal—you’re not through here. Let’s forget about the vacation. I’m transferring you to the radiation laboratory. You belong in research, anyhow; I’d never have spared you from it to stand watches if I hadn’t been short on No. 1 men.

“As for the constant psychological observation, I hate it as much as you do. I don’t suppose you know that they watch me about twice as hard as they watch you duty engineers.” Harper showed his surprise, but Silard nodded in sober confirmation. “But we have to have this supervision. Do you remember Manning? No, he was before your time. We didn’t have psychological observers then. Manning was able and brilliant. Furthermore, he was always cheerful; nothing seemed to bother him.

“I was glad to have him on the bomb, for he was always alert, and never seemed nervous about working with it—in fact, he grew more buoyant and cheerful the longer he stood control watches. I should have known that was a very bad sign, but I didn’t, and there was no observer to tell me so.

“His technician had to slug him one night. He found him dismantling the safety interlocks on the trigger. Poor old Manning never pulled out of it—he’s been violently insane ever since. After Manning cracked up, we worked out the present system of two qualified engineers and an observer for every watch. It seemed the only thing to do.”

"I suppose so, chief," Harper mused, his face no longer sullen, but still unhappy. "It's a hell of a situation just the same."

"That's putting it mildly." King rose and put out his hand. "Cal, unless you're dead set on leaving us, I'll expect to see you at the radiation laboratory tomorrow. Another thing—I don't often recommend, this, but it might do you good to get drunk tonight."

KING HAD SIGNED to Silard to remain after the young man left. Once the door was closed he turned back to the psychiatrist. "There goes another one—and one of the best. Doctor, what am I going to do?"

Silard pulled at his cheek. "I don't know," he admitted. "The hell of it is, Harper's absolutely right. It does increase the strain on them to know that they are being watched—and yet they have to be watched. Your psychiatric staff isn't doing too well, either. It makes us nervous to be around the bomb—the more so because we don't understand it. And it's a strain on us to be hated and despised as we are. Scientific detachment is difficult under such conditions; I'm getting jumpy myself." King ceased pacing the floor and faced the doctor. "But there must be *some* solution—" he insisted.

Silard shook his head. "It's beyond me, superintendent. I see no solution from the standpoint of psychology."

"No? Hm-m-m. Doctor, who is the top man in your field?"

"Eh?"

"Who is the recognized No. 1 man in handling this sort of thing?"

"Why, that's hard to say. Naturally, there isn't any one leading psychiatrist in the world; we specialize too much. I know what you mean, though. You don't want the best industrial-temperament psychometrician; you want the best all-around man for psychoses nonlesional and situational. That would be Lentz."

"Go on."

"Well—He covers the whole field of environmental adjustment. He's the man who correlated the theory of optimum tonicity with the relaxation technique that Korzybski had developed empirically. He actually worked under Korzybski himself, when he was a young student—it's the only thing he's vain about."

"He did? Then he must be pretty old; Korzybski died in—What year did he die?"

"I started to say that you must know his work in symbology—theory of abstraction and calculus of statement, all that sort of thing—because of its applications to engineering and mathematical physics."

"That Lentz—yes, of course. But I had never thought of him as a psychiatrist."

"No, you wouldn't, in your field. Nevertheless, we are inclined to credit him with having done as much to check and reduce the pandemic neuroses of the Crazy Years as any other man, and more than any man left alive."

"Where is he?"

"Why, Chicago, I suppose. At the Institute."

"Get him here."

"Eh?"

"Get him down here. Get on that visiphone and locate him. Then have Steinke call the Port of Chicago, and hire a stratocar to stand by for him. I want to see him as soon as possible—before the day is out." King sat up in his chair with the air of a man who is once more master of himself and the situation. His spirit knew that warming replenishment that comes only with reaching a decision. The harassed expression was gone.

Silard looked duredounded. "But, superintendent," he expostulated, "you can't ring for Dr. Lentz as if he were a junior clerk. He's . . . he's *Lentz*."

“Certainly—that’s why I want him. But I’m not a neurotic clubwoman looking for sympathy, either. He’ll come. If necessary, turn on the heat from Washington. Have the White House call him. But get him here at once. Move!” King strode out of the office.

WHEN ERICKSON came off watch he inquired around and found that Harper had left for town. Accordingly, he dispensed with dinner at the base, shifted into “drinkin’ clothes,” and allowed himself to be dispatched via tube to Paradise.

Paradise, Arizona, was a hard little boom town, which owed its existence to the power plant. It was dedicated exclusively to the serious business of detaching the personnel of the plant from their inordinate salaries. In this worthy project they received much co-operation from the plant personnel themselves, each of whom was receiving from twice to ten times as much money each pay day as he had ever received in any other job, and none of whom was certain of living long enough to justify saving for old age. Besides, the company carried a sinking fund in Manhattan for their dependents; why be stingy?

It was said, with some truth, that any entertainment or luxury obtainable in New York City could be purchased in Paradise. The local chamber of commerce had appropriated the slogan of Reno, Nevada, “Biggest Little City in the World.” The Reno boosters retaliated by claiming that, while any town that close to the atomic power plant undeniably brought thoughts of death and the hereafter, Hell’s Gates would be a more appropriate name than Paradise.

Erickson started making the rounds. There were twenty-seven places licensed to sell liquor in the six blocks of the main street of Paradise. He expected to find Harper in one of them, and, knowing the man’s habits and tastes, he expected to find him in the first two or three he tried.

He was not mistaken. He found Harper sitting alone at a table in the rear of DeLancey’s Sans Souci Bar.

DeLancey’s was a favorite of both of them. There was an old-fashioned comfort about its chrome-plated bar and red leather furniture that appealed to them more than did the’ spectacular fittings of the up-to-the-minute places. DeLancey was conservative; he stuck to indirect lighting and soft music; his hostesses were required to be fully clothed, even in the evening.

The fifth of Scotch in front of Harper was about two thirds full. Erickson shoved three fingers in front of Harper’s face and demanded, “Count!”

“Three,” announced Harper. “Sit down, Gus.”

“That’s correct,” Erickson agreed, sliding his big frame into a low-slung chair. “You’ll do—for now. What was the outcome?”

“Have a drink. Not,” he went on, “that this Scotch is any good. I think Lance has taken to watering it. I surrendered, horse and foot.”

“Lance wouldn’t do that—stick to that theory and you’ll sink in the sidewalk up to your knees. How come you capitulated? I thought you planned to beat ’em about the head and shoulders, at least.”

“I did,” mourned Harper, “but, cripes, Gus, the chief is right. If a brain mechanic says you’re punchy, he has *got* to back him up and take you off the bomb. The chief can’t afford to take a chance.”

“Yeah, the chief’s all right, but I can’t learn to love our dear psychiatrists. Tell you what—let’s find us one, and see if he can feel pain. I’ll hold him while you slug ’im.”

“Oh, forget it, Gus. Have a drink.”

“A pious thought—but not Scotch. I’m going to have a martini; we ought to eat pretty soon.”

“I’ll have one, too.”

"Do you good." Erickson lifted his blond head and bellowed, "Israfel!"

A LARGE, black person appeared at his elbow. "Mistuh Erickson! Yes, sub!"

"Izzy, fetch two martinis. Make mine with Italian." He turned back to Harper. "What are you going to do now, Cal?"

"Radiation laboratory."

"Well, that's not so bad. I'd like to have a go at the matter or rocket fuels myself. I've got some ideas."

Harper looked mildly amused. "You mean atomic fuel for interplanetary flight? That problem's pretty well exhausted. No, son, the stratosphere is the ceiling until we think up something better than rockets. Of course, you *could* mount the bomb in a ship, and figure out some jury rig to convert its radiant output into push, but where does that get you? One bomb, one ship—and twenty years of mining in Little America has only produced enough pitchblende to make one bomb. That's disregarding the question of getting the company to lend you their one bomb for anything that doesn't pay dividends."

Erickson looked balky. "I don't concede that you've covered all the alternatives. What have we got? The early rocket boys went right ahead trying to build better rockets, serene in the belief that, by the time they could build rockets good enough to fly to the Moon, a fuel would be perfected that would do the trick. And they did build ships that were good enough—you could take any ship' that makes the antipodes run, and refit it for the Moon—if you had a fuel that was sufficiently concentrated to maintain the necessary push for the whole run. But they haven't got it.

"And why not? Because we let 'em down, that's why. Because they're still depending on molecular energy, on chemical reactions, with atomic power sitting right here in our laps. It's not their fault—old D.D. Harriman had Rockets Consolidated underwrite the whole first issue of Antarctic Pitchblende, and took a big slice of it himself, in the expectation that we would produce something usable in the way of a concentrated rocket fuel. Did we do it? Like hell! The company went hog-wild for immediate commercial exploitation, and there's no fuel yet."

"But you haven't stated it properly," Harper objected. "There are just two forms of atomic power available, radioactivity and atomic disintegration. The first is too slow; the energy is there, but you can't wait years for it to come out—not in a rocketship. The second we can only manage in a large mass of uranium. There has only been enough uranium mined for one bomb. There you are—stymied."

ERICKSON'S Scandinavian stubbornness was just gathering for another try at the argument when the waiter arrived with the drinks. He set them down with a triumphant flourish. "There you are, sub!"

"Want to roll for them, Izzy?" Harper inquired.

"Don' mind if I do."

The Negro produced a leather dice cup, and Harper rolled. He selected his combinations with care and managed to get four aces and jack in three rolls. Israfel took the cup. He rolled in the grand manner with a backward twist to his wrist. His score finished at five kings, and he courteously accepted the price of six drinks. Harper stirred the engraved cubes with his forefinger.

"Izzy," he asked, "are these the same dice I rolled with?"

"Why, Mistah Harper!" The Negro's expression was pained.

"Skip it," Harper conceded. "I should know better than to gamble with you. I haven't won a roll from you in six weeks. What did you start to say, Gus?"

"I was just going to say that there ought to be a better way to get energy out of—"

But they were joined again, this time by something very seductive in an evening gown that appeared to have been sprayed on her lush figure. She was young, perhaps nineteen or twenty. "You boys lonely?" she asked as she flowed into a chair.

"Nice of you to ask, but we're not," Erickson denied with patient politeness. He jerked a thumb at a solitary figure seated across the room. "Go talk to Hannigan; he's not busy."

She followed his gesture with her eyes, and answered with faint scorn: "Him? He's no use. He's been like that for three weeks—hasn't spoken to a soul. If you ask me, I'd say that he was cracking up."

"That so?" he observed noncommittally. "Here"—he fished out a five-dollar bill and handed it to her—"buy yourself a drink. Maybe we'll look you up later."

"Thanks, boys." The money disappeared under her clothing, and she stood up. "Just ask for Edith."

"Hannigan does look bad," Harper considered, noting the brooding stare and apathetic attitude, "and he has been awfully stand-offish lately, for him. Do you suppose we're obliged to report him?"

"Don't let it worry you," advised Erickson. "There's a spotter on the job now. Look." Harper followed his companion's eyes and recognized Dr. Mott of the psychological staff. He was leaning against the far end of the bar, and nursing a tall glass, which gave him protective coloration. But his stance was such that his field of vision included not only Hannigan, but Erickson and Harper as well.

"Yeah, and he's studying us as well," Harper added. "Damn it to hell, why does it make my back hair rise just to lay eyes on one of them?"

The question was rhetorical; Erickson ignored it. "Let's get out of here," he suggested, "and have dinner somewhere else."

"O.K."

DeLancey himself waited on them as they left. "Going so soon, gentlemen?" he asked, in a voice that implied that their departure would leave him no reason to stay open. "Beautiful lobster thermidor tonight. If you do not like it, you need not pay." He smiled brightly.

"Not sea food, Lance," Harper told him, "not tonight. Tell me—why do you stick around here when you know that the bomb is bound to get you in the long run? Aren't you afraid of it?"

The tavernkeeper's eyebrows shot up. "Afraid of the bomb? But it is my friend!"

"Makes you money, eh?"

"Oh, I do not mean that." He leaned toward them confidentially. "Five years ago I come here to make some money quickly for my family before my cancer of the stomach, it kills me. At the clinic, with the wonderful new radiants you gentlemen make with the aid of the bomb, I am cured—I live again. No, I am not afraid of the bomb; it is my good friend."

"Suppose it blows up?"

"When the good Lord needs me, He will take me." He crossed himself quickly.

As they turned away, Erickson commented in a low voice to Harper. "There's your answer. Cal—if all us engineers had his faith, the bomb wouldn't get us down."

Harper was unconvinced. "I don't know," he mused. "I don't think it's faith; I think it's lack of imagination—and knowledge."

NOTWITHSTANDING King's confidence, Lentz did not show up until the next day. The superintendent was subconsciously a little surprised at his visitor's appearance. He had pictured a master psychologist as wearing flowing hair, an imperial, and having piercing black eyes. But this man was not very tall, was heavy in his framework, and fat—almost gross. He might have been a butcher. Little, piggy, faded-blue eyes peered merrily out from beneath shaggy blond brows. There was no hair anywhere else on the enormous skull, and the apelike jaw was smooth and pink. He was dressed in mussed pajamas of unbleached linen. A long cigarette holder jutted permanently from one corner of a wide mouth, widened still more by a smile which suggested unmalicious amusement at the worst that life, or men, could do. He had gusto.

King found him remarkably easy to talk to.

At Lentz's suggestion the superintendent went first into the history of the atomic power plant, how the fission of the uranium atom by Dr. Otto Hahn in December, 1938, had opened up the way to atomic power. The door was opened just a crack; the process to be self-perpetuating and commercially usable required an enormously greater mass of uranium than there was available in the entire civilized world at that time.

But the discovery, fifteen years later, of enormous deposits of pitchblende in the old rock underlying Little America removed that obstacle. The deposits were similar to those previously worked at Great Bear Lake in the arctic north of Canada, but so much more extensive that the eventual possibility of accumulating enough uranium to build an atomic power plant became evident.

The demand for commercially usable, cheap power had never been satiated. Even the Douglas-Martin sunpower screens, used to drive the roaring road cities of the period and for a myriad other industrial purposes, were not sufficient to fill the ever-growing demand. They had saved the country from impending famine of oil and coal, but their maximum output of approximately one horsepower per square yard of sun-illuminated surface put a definite limit to the power from that source available in any given geographical area.

Atomic power was needed—was demanded.

But theoretical atomic physics predicted that a uranium mass sufficiently large to assist in its own disintegration might assist too well—blow up instantaneously, with such force that it would probably wreck every man-made structure on the globe and conceivably destroy the entire human race as well. They dared not build the bomb, even though the uranium was available.

"It was Destry's mechanics of infinitesimals that showed a way out of the dilemma," King went on. "His equations appeared to predict that an atomic explosion, once started, would disrupt the molar mass inclosing it so rapidly that neutron loss through the outer surface of the fragments would dampen the progression of the atomic explosion to zero before complete explosion could be reached.

"For the mass we use in the bomb, his equations predict a possible force of explosion one seventh of one percent of the force of complete explosion. That alone, of course, would be incomprehensibly destructive—about the equivalent of a hundred and forty thousand tons of TNT—enough to wreck this end of the State. Personally, I've never been sure that is all that would happen."

"Then why did you accept this job?" inquired Lentz.

King fiddled with items on his desk before replying. "I couldn't turn it down, doctor—I *couldn't*. If I had refused, they would have gotten someone else—and it was an opportunity that comes to a physicist once in history."

Lentz nodded. "And probably they would have gotten someone not as competent. I understand, Dr. King—you were compelled by the 'truth-tropism' of the scientist. He must go where the data is to be found, even if it kills him.

But about this fellow Destry, I've never liked his mathematics; he postulates too much."

King looked up in quick surprise, then recalled that this was the man who had refined and given rigor to the calculus of statement. "That's just the hitch," he agreed. "His work is brilliant, but I've never been sure that his predictions were worth the paper they were written on. Nor, apparently," he added bitterly, "do my junior engineers."

He told the psychiatrist of the difficulties they had had with personnel, of how the most carefully selected men would, sooner or later, crack under the strain. "At first I thought it might be some degenerating effect from the hard radiation that leaks out of the bomb, so we improved the screening and the personal armor. But it didn't help. One young fellow who had joined us after the new screening was installed became violent at dinner one night, and insisted that a pork chop was about to explode. I hate to think of what might have happened if he had been on duty at the bomb when he blew up."

THE INAUGURATION of the system of constant psychological observation had greatly reduced the probability of acute danger resulting from a watch engineer cracking up, but King was forced to admit that the system was not a success; there had actually been a marked increase in psychoneuroses, dating from that time.

"And that's the picture, Dr. Lentz. It gets worse all the time. It's getting me now. The strain is telling on me; I can't sleep, and I don't think my judgment is as good as trusted to be—I have trouble making up my mind, of coming to a decision. Do you think you can do anything for us?"

But Lentz had no immediate relief for his anxiety. "Not so fast, superintendent," he countered. "You have given me the background, but I have no real data as yet. I must look around.—for a while, smell out the situation for myself, talk to your engineers, perhaps have a few drinks with them, and get acquainted. That is possible, is it not? Then in a few days, maybe, we'll know where we stand."

King had no alternative but to agree.

"And it is well that your young men do not know what I am here for. Suppose I am your old friend, a visiting physicist, eh?"

"Why, yes—of course. I can see to it that that idea gets around. But say—" King was reminded again of something that had bothered him from the time Silard had first suggested Lentz's name, "may I ask a personal question?"

The merry eyes were undisturbed. "Go ahead."

"I can't help but be surprised that one man. should attain eminence in two such widely differing fields as psychology and mathematics. And right now I'm perfectly convinced of your ability to pass yourself off as a physicist. I don't understand it." The smile was more amused, without being in the least patronizing, nor offensive. "Same subject," he answered.

"Eh? How's that—"

"Or rather, both mathematical physics and psychology are branches of the same subject, symbology. You are a specialist; it would not necessarily come to your attention."

"I still don't follow you."

"No? Man lives in a world of ideas. Any phenomenon is so complex that he cannot possibly grasp the whole of it. He abstracts certain characteristics of a given phenomenon as an idea, then represents that idea as a symbol, be it a word or a mathematical sign. Human reaction is almost entirely reaction to symbols, and only negligibly to phenomena. As a matter of fact," he continued,

removing the cigarette holder from his mouth and settling into his subject, “it can be demonstrated that the human mind can think only in terms of symbols.

“When we think, we let symbols operate on other symbols in certain, set fashions—rules of logic, or rules of mathematics. If the symbols have been abstracted so that they are structurally similar to the phenomena they stand for, and if the symbol operations are similar in structure and order to the operations of phenomena in the real world, we think sanely. If our logic-mathematics, or our word-symbols, have been poorly chosen, we think not sanely.

“In mathematical physics you are concerned with making your symbology fit physical phenomena. In psychiatry I am concerned with precisely the same thing, except that I am more immediately concerned with the man who does the thinking than with the phenomena he is thinking about. But the same subject, always the same subject.”

“WE’RE not getting any place, Gus.” Harper put down his slide rule and frowned.

“Seems like it, Cal,” Erickson grudgingly admitted. “Damn it, though—there ought to be some reasonable way of tackling the problem. What do we need? Some form of concentrated, controllable power for rocket fuel. What have we got? Power galore in the bomb. There must be some way to bottle that power, and serve it out when we need it—and the answer is some place in one of the radioactive series. I *know* it.” He stared glumly around the laboratory as if expecting to find the answer written somewhere on the lead-sheathed walls.

“Don’t be so down in the mouth about it. You’ve got me convinced there is an answer; let’s figure out how to find it. In the first place the three natural radioactive series are out, aren’t they?”

“Yes—at least we had agreed that all that ground had been fully covered before.”

“O.K.; we have to assume that previous investigators have done what their notes show they have done—otherwise we might as well not believe anything, and start checking on everybody from Archimedes to date. Maybe that is indicated, but Methuselah himself couldn’t carry out such an assignment. What have we got left?”

“Artificial radioactives.”

“All right. Let’s set up a list of them, both those that have been made up to now, and those that might possibly be made in the future. Call that our group—or rather, field, if you want to be pedantic about definitions. There are a limited number of operations that can be performed on each member of the group, and on the members taken in combination. Set it up.” Erickson did so, using the curious curlicues of the calculus of statement. Harper nodded. “All right—expand it.”

Erickson looked up after a few moments, and asked, “Cal, have you any idea how many terms there are in the expansion?”

“No—hundreds, maybe thousands, I suppose.”

“You’re conservative. It reaches four figures without considering possible new radioactives. We couldn’t finish such a research in a century.” He chucked his pencil down and looked morose.

Cal Harper looked at him curiously, but with sympathy. “Gus,” he said gently, “the bomb isn’t getting you, too, is it?”

“I don’t think so. Why?”

“I never saw you so willing to give up anything before. Naturally you and I will never finish any such job, but at the very worst we will have eliminated a lot of wrong answers for somebody else. Look at Edison—sixty years of

experimenting, twenty hours a day, yet he never found out the one thing he was most interested in knowing. I guess if he could take it, we can.”

Erickson pulled out of his funk to some extent. “I suppose so,” he agreed. “Anyhow, maybe we could work out some techniques for carrying’ a lot of experiments simultaneously.”

Harper slapped him on the shoulder. “That’s the o!’ light. Besides—we may not need to finish the research, or anything like it, to find a satisfactory fuel. The way I see it, there are probably a dozen, maybe a hundred, right answers. We may run across one of them any day. Anyhow, since you’re willing to give me a hand with it in your off-watch time, I’m game to peck away at it till hell freezes.”

LENTZ pattered around the plant and the administration center for several days, until he was known to everyone by sight. He made himself pleasant and asked questions. He was soon regarded as a harmless nuisance, to be tolerated because he was a friend of the superintendent. He even poked his nose into the commercial power end of the plant, and had the mercury-steam-turbogenerator sequence explained to him in detail. This alone would have been sufficient to disarm any suspicion that he might be a psychiatrist, for the staff psychiatrists paid no attention to the hard-bitten technicians of the power-conversion unit. There was no need to; mental instability on their part could not affect the bomb, nor were they subject to the mankilling strain of social responsibility. Theirs was simply a job personally dangerous, a type of strain strong men have been inured to since the jungle.

In due course he got around to the unit of the radiation laboratory set aside for Calvin Harper’s use. He rang the bell and waited. Harper answered the door, his antiradiation helmet shoved back from his face like a grotesque sunbonnet. “What is it?” he asked. “Oh—it’s you, Dr. Lentz. Did you want to see me?”

“Why, yes and no,” the older man answered. “I was just looking around the experimental station, and wondered what you do in here. Will I be in the way?”

“Not at all. Come in. Gus!”

Erickson got up from where he had been fussing over the power leads to their tigger—a modified cyclotron rather than a resonant accelerator. “Hello.”

“Gus, this is Dr. Lentz—Gus Erickson.”

“We’ve met,” said Erickson, pulling off his gauntlet to shake hands. He had had a couple of drinks with Lentz in town and considered him a “nice old duck.”

“You’re just between shows, but stick around and we’ll start another run—not that there is much to see.”

While Erickson continued with the set-up, Harper conducted Lentz around the laboratory, explaining the line of research they were conducting, as happy as a father showing off twins. The psychiatrist listened with one ear and made appropriate comments while he studied the young scientist for signs of the instability he had noted to be recorded against him.

“You see,” Harper explained, oblivious to the interest in himself, “we are testing radioactive materials to see if we can produce disintegration of the soil that takes place in the bomb, but in a minute, almost microscopic, mass. If we are successful, we can use the power of the bomb to make a safe, convenient, atomic fuel for rockets.” He went on to explain their schedule of experimentation.

“I see,” Lentz observed politely. “What metal are you examining now?”

Harper told him. “But it’s not a case of examining one element—we’ve finished Isotope II with negative results. Our schedule calls next for running the same test on Isotope V. Like this.” He hauled out a lead capsule, and showed the

label to Lentz, who saw that it was, indeed, marked with the symbol of the fifth isotope. He hurried away to the shield around the target of the cyclotron, left open by Erickson. Lentz saw that he had opened the capsule, and was performing some operation on it in a gingerly manner, having first lowered his helmet. Then he closed and clamped the target shield.

“O.K., Gus?” he called out. “Ready to roll?”

“Yeah, I guess so,” Erickson assured him, coming around from behind the ponderous apparatus, and rejoining them. They crowded belling a thick metal shield that cut them off from direct sight of the set-up.

“Will I need to put on armor?” inquired Lentz.

“No,” Erickson reassured him, “we wear it because we are around the stuff day in and day out. You just stay behind the shield and you’ll be all right. It’s lead—backed up by eight inches of case-hardened armor plate.

ERICKSON glanced at Harper, who nodded, and fixed his eyes on a panel of instruments mounted behind the shield. Lentz saw Erickson press a push button at the top of the board, then heard a series of relays click on the far side of the shield. There was a short moment of silence.

The floor slapped his feet like some incredible bastinado. The concussion that beat on his ears was so intense that it paralyzed the auditory nerve almost before it could be recorded as sound. The air-conducted concussion wave flailed every inch of his body with a single, stinging, numbing blow. As he picked himself up, he found he was trembling uncontrollably and realized, for the first time, that he was getting old.

Harper was seated on the floor and had commenced to bleed from the nose. Erickson had gotten up; his cheek was cut. He touched a hand to the wound, then stood there, regarding the blood on his fingers with a puzzled expression on his face.

“Are you hurt?” Lentz inquired inanely. “What happened?”

Harper cut in. “Gus, we’ve done it! We’ve done it! Isotope V’s turned the trick!”

Erickson looked still more bemused. “Five?” he said stupidly. “But that wasn’t Five; that, was Isotope II. I put it in myself.”

“You put it in? I put it in! It was Five, I tell you!”

They stood staring at each other, still confused by the explosion, and each a little annoyed at the bone-headed stupidity the other displayed in the face of the obvious. Lentz diffidently interceded.

“Wait a minute, boys,” he suggested. “Maybe there’s a reason—(his, you placed a quantity of the second isotope in the receiver?”

“Why, yes, certainly. I wasn’t satisfied with the last run, and I wanted to check it.”

Lentz nodded. “It’s my fault, gentlemen,” he admitted ruefully. “I came in and disturbed your routine, and both of you charged the receiver. I know Harper did, for I saw him do it—with Isotope V. I’m sorry.”

Understanding broke over Harper’s face, and he slapped the older man on the shoulder. “Don’t be sorry,” he laughed; “you can come around to our lab and help us make mistakes any time you feel in the mood. Can’t he, Gus? This is the answer, Dr. Lentz; this is it!”

“Hut,” the psychiatrist pointed out, “you don’t know which isotope blew up.”

“Nor care,” Harper supplemented. “Maybe it was both, taken together. But we *will* know—this business is cracked now; we’ll soon have it open.” He gazed happily around at the wreckage.

IN SPITE of Superintendent King's anxiety, Lentz refused to be hurried in passing judgment on the situation. Consequently, when he did present himself at King's office, and announced that he was ready to report, King was pleasantly surprised as well as relieved. "Well, I'm delighted," he said. "Sit down, doctor, sit down. Have a cigar. What do we do about it?"

But Lentz stuck to his perennial cigarette and refused to be hurried. "I must have some information first. How important," he demanded, "is the power from your plant?"

King understood the implication at once. "If you are thinking about shutting down the bomb for more than a limited period, it can't be done."

"Why not? If the figures supplied me are correct, your output is less than thirteen percent of the total power used in the country."

"Yes, that is true, but you haven't considered the items that go in to make up the total. A lot of it is domestic power, which householders get from sunscreens located on their own roofs. Another big slice is power for the moving roadways—that's sun-power again. The portion we provide here is the main power source for most of the heavy industries—steel, plastics, lithics, all kinds of manufacturing and processing. You might as well cut the heart out of a man—"

"But the food industry isn't basically dependent on you?" Lentz persisted.

"No. Food isn't basically a power industry—although, we do supply a certain percentage of the power used in processing. I see your point, and will go on and concede that transportation—that is to say, distribution of food—could get along without us. But, good heavens, doctor, you can't stop atomic power without causing the biggest panic this country has ever seen. It's the keystone of our whole industrial system."

"The country has lived through panics before, and we got past the oil shortage safely."

"Yes—because atomic power came along to take the place of oil. You don't realize what this would mean, doctor. It would be worse than a war; in a system like ours, one thing depends on another. If you cut off the heavy industries all at once, everything else stops, too."

"Nevertheless, you had better dump the bomb." The uranium in the bomb was molten, its temperature being greater than twenty-four hundred degrees centigrade. The bomb could be dumped into a group of small containers, when it was desired to shut it down. The mass in any one container was too small to maintain progressive atomic disintegration.

King glanced involuntarily at the glass-enclosed relay mounted on his office wall, by which he, as well as the engineer on duty, could dump the bomb, if need be. "But I couldn't do that—or rather, if I did, the plant wouldn't stay shut down. The directors would simply replace me with someone who *would* operate the bomb."

"You're right, of course." Lentz silently considered the situation for some time, then said, "Superintendent, will you order a car to fly me back to Chicago?"

"You're going, doctor?"

"Yes." He took the cigarette holder from his face, and, for once, the smile of Olympian detachment was gone completely. His entire manner was sober, even tragic. "Short of shutting down the bomb, there is no solution to your problem—none whatsoever!"

"I OWE YOU a full explanation," Lentz continued, at length. "You are confronted here with recurring instances of situational psychoneurosis. Roughly, the symptoms manifest themselves as anxiety neurosis or some form

of hysteria. The partial amnesia of your secretary, Steinke, is a good example of the hitter. He might be cured with shock technique, but it would hardly be a kindness, as he has achieved a stable adjustment which puts him beyond the reach of the strain he could not stand.

“That other young fellow, Harper, whose blowup was the immediate cause of your sending for me, is an anxiety case. When the cause of the anxiety was eliminated from his matrix, he at once regained full sanity. But keep a close watch on his friend, Erickson—

“However, it is the cause, and prevention, of situational psychoneurosis we are concerned with here, rather than the forms in which it is manifested. In plain language, psychoneurosis situational simply refers to the common fact that, if you put a man in a situation that worries him more than he can stand, in time he blows up, one way or another.

“That is precisely the situation here. You take sensitive, intelligent young men, impress them with the fact that a single slip on their part, or even some fortuitous circumstance beyond their control, will result in the death of God knows how many other people, and then expect them to remain sane. It’s ridiculous—impossible!”

“But good heavens, doctor, there must be some answer! There must!” He got up and paced around the room. Lentz noted, with pity, that King himself was riding the ragged edge of the very condition they were discussing.

“No,” he said slowly. “No. Let me explain. You don’t dare intrust the bomb to less sensitive, less socially conscious men. You might as well turn the controls over to a mindless idiot. And to psychoneurosis situational there are but two cures. The first obtains when the psychosis results from a misevaluation of environment. That cure calls for semantic readjustment. One assists the patient to evaluate correctly his environment. The worry disappears because there never was a real reason for worry in the situation itself, but simply in the wrong meaning the patient’s mind had assigned to it.

“The second case is when the patient has correctly evaluated the situation, and rightly finds in it cause for extreme worry. His worry is perfectly sane and proper, but he can not stand up under it indefinitely; it drives him crazy. The only possible cure is to change the situation. I have stayed here long enough to assure myself that such is the condition here. Your engineers have correctly evaluated the public danger of this bomb, and it will, with dreadful certainty, drive all of you crazy!

“The only possible solution is to dump the bomb—and leave it dumped.”

KING had continued his nervous pacing of the floor, as if the walls of the room itself were the cage of his dilemma. Now he stopped and appealed once more to the psychiatrist. “Isn’t there *anything* I can do?”

“Nothing to cure. To alleviate—well, possibly.”

“How?”

“Situational psychosis results from adrenalin exhaustion. When a man is placed under a nervous strain, his adrenal glands increase their secretion to help compensate for the strain. If the strain is too great and lasts too long, the adrenals aren’t equal to the task, and he cracks. That is what you have here. Adrenalin therapy might stave off a mental breakdown, but it most assuredly would hasten a physical breakdown. But that would be safer from a viewpoint of public welfare—even though it assumes that physicists are expendable!

“Another thing occurs to me: If you selected any new watch engineers from the membership of churches that practice the confessional, it would increase the length of their usefulness.”

King was plainly surprised. "I don't follow you."

"The patient unloads most of his worry on his confessor, who is not himself actually confronted by the situation, and can stand it. That is simply an ameliorative, however. I am convinced that, in this situation, eventual insanity is inevitable. But there is a lot of good sense in the confessional," he added. "It fills a basic human need. I think that is why the early psychoanalysts were so surprisingly successful, for all their limited knowledge." He fell silent for a while, then added, "If you will be so kind as to order a stratocab for me—"

"You've nothing more to suggest?"

"No.' You had better turn your psychological staff loose on means of alleviation; they're able men, all of them."

King pressed a switch and spoke briefly to Steinke. Turning back to Lentz, he said, "You'll wait here until your car is ready?"

Lentz judged correctly that King desired it and agreed.

Presently the tube delivery on King's desk went *ping!* The superintendent removed a small white pasteboard, a calling card. He studied it with surprise and passed it over to Lentz. "I can't imagine why he should be calling on me," he observed, and added, "Would you like to meet him?"

Lentz read:

THOMAS P. HARRINGTON
CAPTAIN (MATHEMATICS)
UNITED STATES NAVY

DIRECTOR,
U.S. NAVAL OBSERVATORY

"But I do know him," he said. "I'd be very pleased to see him."

Harrington was a man with something on his mind. He seemed relieved when Steinke had finished ushering him in, and had returned to the outer office. He commenced to speak at once, turning to Lentz, who was nearer to him than King. "You're King? . . . Why, Dr. Lentz! What are you doing here?"

"Visiting," answered Lentz, accurately but incompletely, as he shook hands. "This is Superintendent King over here. Superintendent King—Captain Harrington."

"How do you do, captain—it's a pleasure to have you here."

"It's an honor to be here, sir."

"Sit down?"

"Thanks." He accepted a chair and laid a brief case on a corner of King's desk. "Superintendent, you are entitled to an explanation as to why I have broken in on you like this—"

"Glad to have you." In fact, the routine of formal politeness was an anodyne to King's frayed nerves.

"That's kind of you, but—That secretary chap, the one that brought me in here, would it be too much to ask you to tell him to forget my name? I know it seems strange—"

"Not at all." King was mystified, but willing to grant any reasonable request of a distinguished colleague in science. He summoned Steinke to the interoffice visiphone and gave him his orders.

Lentz stood up and indicated that he was about to leave. He caught Harrington's eye. "I think you want a private palaver, captain."

King looked from Harrington to Lentz and back to Harrington. The astronomer showed momentary indecision, then protested: "I have no objection at all myself; it's up to Dr. King. As a matter of fact," he added, "it might be a very good thing if you did sit in on it."

"I don't, know what it is, captain," observed King, "that you want to see me about, but Dr. Lentz is already here in a confidential capacity."

"Good! Then, that's settled. I'll get right down to business. Dr. King, you know Destry's mechanics of infinitesimals?"

"Naturally." Lentz cocked a brow at King, who chose to ignore it, "Yes, of course. Do you remember theorem six and the transformation between equations thirteen and fourteen?"

"I think so, but I'd want to see them," King got up and went over to a bookcase. Harrington stayed him with a hand.

"Don't bother. I have them here." He hauled out a key, unlocked his brief case, and drew out a large, much-thumbed, loose-leaf notebook. "Here. You, too, Dr. Lentz. Are you familiar with this development?"

Lentz nodded. "I've had occasion to look into them."

"Good—I think it's agreed that the step between thirteen and fourteen is the key to the whole matter. Now, the change from thirteen to fourteen looks perfectly valid—and would be, in some fields. But suppose we expand it to show every possible phase of the matter, every link in the chain of reasoning."

He turned a page and showed them the same two equations broken down into nine intermediate equations. He placed a finger under an associated group of mathematical symbols. "Do you see that? Do you see what that implies?" He peered anxiously at their faces.

King studied it, his lips moving.

"Yes . . . I believe I do see. Odd . . . *I* never looked at it just that way before—yet I've studied those equations until I've dreamed about them." He turned to Lentz. "Do you agree, doctor?"

Lentz nodded slowly. "I believe so . . . Yes, I think I may say so."

Harrington should have been pleased; he wasn't. "I had hoped you could tell me I was wrong," he said, almost petulantly, "but I'm afraid there is no further doubt about it. Dr. Destry included an assumption valid in molar physics, but for which we have absolutely no assurance in atomic physics. I suppose you realize what this means to you, Dr. King?"

King's voice was a dry whisper. "Yes," he said, "yes—It means that if that bomb out there ever blows up, we must assume that it will go up all at once, rather than the way Destry predicted—and God help the human race!"

CAPTAIN HARRINGTON cleared his throat to break the silence that followed. "Superintendent," he said, "I would not have ventured to call had it been simply a matter of disagreement as to interpretation of theoretical predictions—"

"You have something more to go on?"

"Yes and no. Probably you gentlemen think of the Naval Observatory as being exclusively preoccupied with ephemerides and tide tables. In a way you would be right—but we still have some time to devote to research as long as it doesn't cut into the appropriation. My special interest has always been lunar theory.

"I don't mean lunar ballistics," he continued. "I mean the much more interesting problem of its origin and history, the problem the younger Darwin struggled with, as well as my illustrious predecessor, Captain T.J. I. See. I think that it is obvious that any theory of lunar origin and history must take into account the surface features of the Moon—especially the mountains, the craters, that mark its face so prominently."

He paused momentarily, and Superintendent King put in: "Just a minute, captain—I may be stupid, or perhaps I missed something, but—is there a connection between what we were discussing before and lunar theory?"

“Bear with me for a few moments, Dr. King,” Harrington apologized. “There is a connection—at least, I’m *afraid* there is a connection—but I would rather present my points in their proper order before making my conclusions.” They granted him an alert silence; he went on:

“Although we are in the habit of referring to the ‘craters’ of the Moon, we know they are not volcanic craters. Superficially, they follow none of the rules of terrestrial volcanoes in appearance or distribution, but when Rutter came out in 1952 with his monograph on the dynamics of vulcanology, he proved rather conclusively that the lunar craters could not be caused by anything that we know as volcanic action.

“That left the bombardment theory as the simplest hypothesis. It looks good, on the face of it, and a few minutes spent throwing pebbles into a patch of mud will convince anyone that the lunar craters could have been formed by falling meteors.

“But there are difficulties. If the Moon was struck so repeatedly, why not the Earth? It hardly seems necessary to mention that the Earth’s atmosphere would be no protection against masses big enough to form craters like Endymion or Plato. And if they fell after the Moon was a dead world while the Earth was still young enough to change its face and erase the marks of bombardment, why did the meteors avoid so nearly completely the great dry basins we call lunar seas?

“I want to cut this short; you’ll find the data and the mathematical investigations from the data here in my notes. There is one other major objection to the meteor-bombardment theory: the great rays that spread from Tycho across almost the entire surface of the Moon. It makes the Moon look like a crystal ball that had been struck with a hammer, and impact from outside seems evident, but there are difficulties. The striking mass, our hypothetical meteor, must be small enough to have formed the crater of Tycho, but it must have the mass and speed to crack an entire planet.

“Work it out for yourself—you must either postulate a chunk out of the core of a dwarf star, or speeds such as we have never observed within the system. It’s conceivable but a farfetched explanation.”

He turned to King. “Doctor, does anything occur to you that might account for a phenomenon like Tycho?”

The superintendent grasped the arms of his chair, then glanced at his palms. He fumbled for a handkerchief, and wiped them. “Go ahead,” he said, almost, inaudibly.

“VERY WELL then.” Harrington drew out of his brief case a large photograph of the Moon—a beautiful full-Moon portrait made at Lick. “I want you to imagine the Moon as she might have been sometime in the past. The dark areas we call the ‘seas’ are actual oceans. It has an atmosphere, perhaps a heavier gas than oxygen and nitrogen, but an active gas, capable of supporting some conceivable form of life.

“For this is an inhabited planet, inhabited by intelligent beings, beings capable of discovering atomic power and exploiting it!”

He pointed out on the photograph, near the southern limb, the lime-white circle of Tycho, with its shining, incredible, thousand-mile-long rays spreading, thrusting, jutting out from it. “Here . . . here at Tycho was located their main power plant.” He moved his finger to a point near the equator and somewhat east of meridian—the point where three great dark areas merged, *Mare Nubium*, *Mare Imbrium*, *Oceanus Procellarum*—and picked out two bright splotches surrounded, also, by rays, but shorter, less distinct, and wavy. “And here at

Copernicus and at Kepler, on islands at the middle of a great ocean, were secondary power stations.”

He paused, and interpolated soberly: “Perhaps they knew the danger they ran, but wanted power so badly that they were willing to gamble the life of their race. Perhaps they were ignorant of the ruinous possibilities of their little machines, or perhaps their mathematicians assured them that it could not happen.

“But we will never know—no one can ever know. For it blew up and killed them—and it killed their planet.

“It whisked off the gassy envelope and blew it into outer space. It blasted great chunks off the planet’s crust. Perhaps some of that escaped completely, too, but all that did not reach the speed of escape fell back down in time and splashed great ring-shaped craters in the land.

“The oceans cushioned the shock; only the more massive fragments formed craters through the water. Perhaps some life still remained in those ocean depths. If so, it was doomed to die—for the water, unprotected by atmospheric pressure, could not remain liquid and must inevitably escape in time to outer space. Its lifeblood drained away. The planet was dead—dead by suicide!”

He met the grave eyes of his two silent listeners with an expression almost of appeal. “Gentlemen . . . this is only a theory, I realize . . . only a theory, a dream, a nightmare . . . but it has kept me awake so many nights that I had to come tell you about it, and see if you saw it the same way I do. As for the mechanics of it, it’s all in there in my notes. You can check it—and I pray that you find some error! But it is the only lunar theory I have examined which included all of the known data and accounted for all of them.”

He appeared to have finished. Lentz spoke up. “Suppose, captain, suppose we check your mathematics and find no flaw—what then?”

Harrington flung out his hands. “That’s what I came here to find out!”

ALTHOUGH Lentz had asked the question, Harrington directed the appeal to King. The superintendent looked up; his eyes met the astronomer’s, wavered and dropped again. “There’s nothing to be done,” he said dully, “nothing at all.”

Harrington stared at him in open amazement. “But good God, man!” he burst out. “Don’t you see it? That bomb has *got* to be disassembled—at once!”

“Take it easy, captain.” Lentz’s calm voice was a spray of cold water. “And don’t be too harsh on poor King—this worries him even more than it does you. What he means is this: we’re not faced with a problem in physics, but with a political and economic situation. Let’s put it this way: King can no more dump the bomb than a peasant with a vineyard on the slopes of Mount Vesuvius can abandon his holdings and pauperize his family simply because there will be an eruption some day.

“King doesn’t own that bomb out there; he’s only the custodian. If he dumps it against the wishes of the legal owners, they’ll simply oust him and put in someone more amenable. No, we have to convince the owners.”

“The president could do it,” suggested Harrington. “I could get to the president—”

“No doubt you could, through the navy department. And you might even convince him. But could he help much?”

“Why, of course he could. He’s the *president!*”

“Wait a minute. You’re director of the Naval Observatory; suppose you took a sledge hammer and tried to smash the big telescope—how far would you get?”

“Not very far,” Harrington conceded. “We guard the big fellow pretty closely.”

“Nor can the president act in an arbitrary manner,” Lentz persisted. “He’s not an unlimited monarch. If he shuts down this plant without due process of law, the Federal courts will tie him in knots. I admit that Congress isn’t helpless, but—would you like to try to give a congressional committee a course in the mechanics of infinitesimals?”

Harrington readily stipulated the point. “But there is another way,” he pointed out. “Congress is responsive to public opinion. What we need to do is to convince the public that the bomb is a menace to everybody. That could be done without ever trying to explain things in terms of higher mathematics.”

“Certainly it could,” Lentz agreed. “You could go on the air with it and scare everybody half to death. You could create the damnedest panic this slightly slug-nutty country has ever seen. No, thank you. I, for one, would rather have us all take the chance of being quietly killed than bring on a mass psychosis that would destroy the culture we are building up. I think one taste of the Crazy Years is enough.”

“Well, then, what do you suggest?”

Lentz considered shortly, then answered: “All I see is a forlorn hope.

We’ve got to work on the board of directors and try to beat some sense into their heads.”

King, who had been following the discussion with attention in spite of his tired despondency, interjected a remark: “How would you go about that?”

“I don’t know,” Lentz admitted. “Ft. will take some thinking. But it seems the most fruitful line of approach. If it doesn’t work, we can always fall back on Harrington’s notion of publicity—I don’t insist that the world commit suicide to satisfy my criteria of evaluation.”

Harrington glanced at his wrist watch—a bulky affair—and whistled. “Good heavens!” he exclaimed. “I forgot the time! I’m supposed officially to be at the Flagstaff Observatory.”

King had automatically noted the time shown by the captain’s watch as it was displayed. “But it can’t be that late,” he had objected. Harrington looked puzzled, then laughed.

“It isn’t—not by two hours. We are in zone plus-seven; this shows zone plus-five—it’s radio-synchronized with the master clock at Washington.”

“Did you say radio-synchronized?”

“Yes. Clever, isn’t it?” He held it out for inspection. “I call it a telechronometer; it’s the only one of its sort to date. My nephew designed it for me. He’s a bright one, that boy. He’ll go far. That is”—his face clouded, as if the little interlude had only served to emphasize the tragedy that hung over them—“if any of us live that long!”

A signal light glowed at King’s desk, and Steinke’s face showed on the communicator screen. King answered him, then said, “Your car is ready, Dr. Lentz.”

“Let Captain Harrington have it.”

“Then you’re not going back to Chicago?”

“No. The situation has changed. If you want me, I’m stringing along.”

THE FOLLOWING Friday, Steinke ushered Lentz into King’s office. King looked almost happy as he shook hands. “When did you ground, doctor? I didn’t expect you back for another hour or so.”

“Just now. I hired a cab instead of waiting for the shuttle.”

“Any luck?”

"None. The same answer they gave you: 'The company is assured by independent experts that Destry's mechanics is valid, and sees no reason to encourage an hysterical attitude among its employees.'"

King tapped on his desk top, his eyes unfocused. Then, hitching himself around to face Lentz directly, he said, "Do you suppose the chairman is right?"

"How?"

"Could the three of us—you, me and Harrington—have gone off the deep end—slipped mentally?"

"No."

"You're sure?"

"Certain. I looked up some independent experts of my own, not retained by the company, and had them check Harrington's work. It checks." Lentz purposely neglected to mention that he had done so partly because he was none too sure of King's present mental stability.

King sat up briskly, reached out and stabbed a push button. "I am going to make one more try," he explained, "to see if I can't throw a scare into Dixon's thick head. Steinke," he said to the communicator, "get me Mr. Dixon on the screen."

"Yes, sir."

In about two minutes the visiphone screen came to life and showed the features of Chairman Dixon. He was transmitting, not from his office, but from the board room of the company in Jersey City. "Yes?" he said.

"What is it, superintendent?" His manner was somehow both querulous and affable.

"Mr. Dixon," King began, "I've called to try to impress on you the seriousness of the company's action. I stake my scientific reputation that Harrington has proved completely that—"

"Oh, that? Mr. King, I thought you understood that that was a closed matter."

"But, Mr. Dixon—"

"Superintendent, please! If there were any possible legitimate cause to fear, do you think I would hesitate? I have children, you know, and grandchildren."

"That is just why—"

"We try to conduct the affairs of the company with reasonable wisdom and in the public interest. But we have other responsibilities, too. There are hundreds of thousands of little stockholders who expect us to show a reasonable return on their investment. You must not expect us to jettison a billion-dollar corporation just because you've taken up astrology! Moon theory!" He sniffed.

"Very well, Mr. Chairman." King's tone was stiff.

"Don't take it that way, Mr. King. I'm glad you called—the board has just adjourned a special meeting. They have decided to accept you for retirement—with full pay, of course."

"I did not apply for retirement!"

"I know, Mr. King, but the board feels that—"

"I understand. Good-by!"

"Mr. King—"

"Good-by!" He switched him off, and turned to Lentz. "'—with full pay,'" he quoted, "which I can enjoy in any way that I like for the rest of my life—just as happy as a man in the death house!"

"Exactly," Lentz agreed. "Well, we've tried our way. I suppose we should call up Harrington now and let him try the political and publicity method."

"I suppose so," King seconded absent-mindedly. "Will you be leaving for Chicago now?"

"No," said Lentz. "No . . . I think I will catch the shuttle for Los Angeles and take the evening rocket for the antipodes."

King looked surprised, but said nothing. Lentz answered the unspoken comment. "Perhaps some of us on the other side of the Earth will survive. I've done all that I can here. I would rather be a live sheep-herder in Australia than a dead psychiatrist in Chicago."

King nodded vigorously. "That shows horse sense. For two cents, I'd dump the bomb now and go with you."

"Not horse sense, ray friend—a horse will run back into a burning barn, which is, exactly *not* what I plan to do. Why don't you do it and come along? If you did, it would help Harrington to scare 'em to death."

"I believe I will!"

Steinke's face appeared again on the screen. "Harper and Erickson are here, chief."

"I'm busy."

"They are pretty urgent about seeing you."

"Oh . . . all right," King said in a tired voice, "show them in. It doesn't matter."

They breezed in, Harper in the van. He commenced talking at once, oblivious to the superintendent's morose preoccupation. "We've got it, chief, we've got it—and it all checks out to the umpteenth decimal!"

"You've got what? Speak English."

Harper grinned. He was enjoying his moment of triumph, and was stretching it out to savor it. "Chief, do you remember a few weeks back when I asked for an additional allotment—a special one without specifying how I was going to spend it?"

"Yes. Come on—get to the point."

"You kicked at first, but finally granted it. Remember? Well, we've got something to show for it, all tied up in pink ribbon. It's the greatest advance in radioactivity since Hahn split the nucleus. Atomic fuel, chief, atomic fuel, safe, concentrated, and controllable. Suitable for rockets, for power plants, for any damn thing you care to use it for."

King showed alert interest for the first time. "You mean a power source that doesn't require the bomb?"

"The bomb? Oh, no, I didn't say that. You use the bomb to make the fuel, then you use the fuel anywhere and anyhow you like, with something like ninety-two percent recovery of the energy of the bomb. But you could junk the mercury-steam sequence, if you wanted to."

King's first wild hope of a way out of his dilemma was dashed; he subsided. "Go ahead. Tell me about it."

"Well—it's a matter of artificial radioactives. Just before I asked for that special research allotment, Erickson and I—Dr. Lentz had a finger in it, too—found two isotopes of a radioactive that seemed to be mutually antagonistic. That is, when we goosed 'em in the presence of each other they gave up their latent energy all at once—blew all to hell. The important point is, we were using just a gnat's whisker of mass of each—the reaction didn't require a big mass like the bomb to maintain it."

"I don't see," objected King, "how that could—"

"Neither do we, quite—but it works. We've kept it quiet until we were sure. We checked on what we had, and we found a dozen other fuels. Probably well be able to tailor-make fuels for any desired purpose. But here it is." Harper handed King a bound sheaf of typewritten notes which he had been carrying under his arm. "That's your copy. Look it over."

King started to do so. Lentz joined him, after a look that was a silent request for permission, which Erickson had answered with his only verbal contribution, "Sure, doc."

AS KING read, the troubled feelings of an acutely harassed executive left him. His dominant personality took charge, that of the scientist. He enjoyed the controlled and cerebral ecstasy of the impersonal seeker for the elusive truth. The emotions felt in the throbbing thalamus were permitted only to form a sensuous obbligato for the cold flame of cortical activity. For the time being, he was sane, more nearly completely sane than most men ever achieve at any time.

For a Jong period there was only an occasional grunt, the clatter of turned pages, a nod of approval. At last he put it down.

"It's the stuff," he said. "You've done it, boys. It's great; I'm proud of you."

Erickson glowed a bright pink and swallowed. Harper's small, tense figure gave the ghost of a wriggle, reminiscent of a wire-haired terrier receiving approval. "That's fine, chief. We'd rather hear you say that than get the Nobel Prize."

"I think you'll probably get it. However"—the proud light in his eyes died down—"I'm not going to take any action in this matter."

"Why not, chief?" Harper's tone was bewildered.

"I'm being retired. My successor will take over in the near future; this is too big a matter to start just before a change in administration."

"You being *retired!* Blazes!"

"About the same reason I took you off the bomb—at least, the directors think so."

"But that's nonsense! You were right to take me off the bomb; I *was* getting jumpy. But you're another matter—we all depend on you."

"Thanks, Cal—but that's how it is; there's nothing to be done about it." He turned to Lentz. "I think this is the last ironical touch needed to make the whole thing pure farce," he observed bitterly. "This thing is big, bigger than we can guess at this stage—and I have to give it a miss."

"Well," Harper burst out, "I can think of something to do about it!" He strode over to King's desk and snatched up the manuscript. "Either you superintend the exploitation or the company can damn well get along without our discovery!" Erickson concurred belligerently.

"Wait a minute." Lentz bad the floor. "Dr. Harper, have you already achieved a practical rocket fuel?"

"I said so. We've got it on hand now."

"An escape-speed fuel?" They understood his verbal shorthand—a fuel that would lift a rocket free of the Earth's gravitational pull.

"Sure. Why, you could take any of the Clipper rockets, refit them a trifle, and have breakfast on the Moon."

"Very well. Bear with me—" He obtained a sheet of paper from King and commenced to write. They watched in mystified impatience. He continued briskly for some minutes, hesitating only momentarily. Presently he stopped and spun the paper over to King. "Solve it!" he demanded.

King studied the paper. Lentz had assigned symbols to a great number of factors, some social, some psychological, some physical, some economic. He had thrown them together into a structural relationship, using the symbols of calculus of statement. King understood the paramathematical operations indicated by the symbols, but he was not as used to them as he was to the symbols and operations of mathematical physics. He plowed through the equations, moving his lips slightly in unconscious subvocalization.

He accepted a pencil from Lentz and completed the solution. It required several more lines, a few more equations, before the elements canceled out, or rearranged themselves, into a definite answer.

He stared at this answer while puzzlement gave way to dawning comprehension and delight.

He looked up. "Erickson! Harper!" he rapped out. "We will take your new fuel, refit a large rocket, install the bomb in it, and throw it into an orbit around the Earth, far out in space. There we will use it to make more fuel, safe fuel, for use on Earth, with the danger from the bomb itself limited to the operators actually on watch!"

There was no applause. It was not that sort of an idea; their minds were still struggling with the complex implications.

"But, chief," Harper finally managed, "how about your retirement? We're still not going to stand for it."

"Don't worry," King assured him. "It's all in there, implicit in those equations, you two, me, Lentz, the board of directors—and just what we all have to do to accomplish it."

"All except the matter of time," Lentz cautioned.

"Eh?"

"You'll note that elapsed time appears in your answer as an undetermined unknown."

"Yes . . . yes, of course. That's the chance we have to take. Let's get busy!"

CHAIRMAN DIXON called the board of directors to order. "This being a special meeting, we'll dispense with minutes and reports," he announced.

"As set forth in the call we have agreed to give the retiring superintendent three hours of our time."

"Mr. Chairman—"

"Yes, Mr. Thornton?"

"I thought we had settled that matter."

"We have, Mr. Thornton, but in view of Superintendent King's long and distinguished service, if he asks a hearing, we are honor bound to grant it. You have the door, Dr. King."

King got up and stated briefly, "Dr. Lentz will speak for me." He sat down.

Lentz had to wait till coughing, throat clearing and scraping of chairs subsided. It was evident that the board resented the outsider.

Lentz ran quickly over the main points in the argument which contended that the bomb presented an intolerable danger anywhere on the face of the Earth. He moved on at once to the alternative proposal that the bomb should be located in a rocketship, an artificial moonlet flying in a free orbit around the Earth at a convenient distance—say, fifteen thousand miles—while secondary power stations on Earth burned a safe fuel manufactured by the bomb.

He announced the discovery of the Harper-Erickson technique and dwelt on what it meant to them commercially. Each point was presented as persuasively as possible, with the full power of his engaging personality. Then he paused and waited for them to blow off steam.

They did. "Visionary—"

"Unproved—"

"No essential change in the situation—The substance of it was that they were very happy to hear of the new fuel, but not particularly impressed by it. Perhaps in another twenty years, after it had been thoroughly tested and proved commercially, and provided enough uranium had been mined to build another bomb, they might consider setting up another power station outside the atmosphere. In the meantime there was no hurry. *t* Lentz patiently and politely dealt with their objections. He emphasized the increasing incidence of occupational psychoneurosis among the engineers and the grave danger to everyone near the bomb even under the orthodox theory. He reminded them of

their insurance and indemnity-bond costs, and of the “squeeze” they paid State politicians.

Then he changed his tone and let them have it directly and brutally. “Gentlemen,” he said, “we believe that we are fighting for our lives—our own lives, our families and every life on the globe. If you refuse this compromise, we will fight as fiercely and with as little regard for fair play as any cornered animal.” With that he made his first move in attack.

It was quite simple. He offered for their inspection the outline of a propaganda campaign on a national scale, such as any major advertising firm could carry out as a matter of routine. It was complete to the last detail, television broadcasts, spot plugs, newspaper and magazine coverage with planted editorials, dummy “citizens’ committees” and—most important—a supporting whispering campaign and a letters-to-Congress organization. Every businessman there knew from experience how such things worked.

But its object was to stir up fear of the bomb and to direct that fear, not into panic, but into rage against the board of directors personally, and into a demand that the government take action to have the bomb removed to outer space.

“This is blackmail! We’ll stop you!”

“I think not,” Lentz replied gently. “You may be able to keep us out of some of the newspapers, but you can’t stop the rest of it. You can’t even keep us off the air—ask the Federal Communications Commission.” It was true. Harrington had handled the political end and had performed his assignment well; the president was convinced.

Tempers were snapping on all sides; Dixon had to pound for order. “Dr. Lentz,” he said, his own temper under taut control, “you plan to make every one of us appear a blackhearted scoundrel with no other thought than personal profit, even at the expense of the lives of others. You know that is not true; this is a simple difference of opinion as to what is wise.”

“I did not say it was true,” Lentz admitted blandly, “but you will admit that I can convince the public that you are deliberate villains. As to it being a difference of opinion—you are none of you atomic physicists; you are not entitled to hold opinions in this matter.

“As a matter of fact,” he went on callously, “the only doubt in my mind is whether or not an enraged public will destroy your precious power plant before Congress has time to exercise eminent domain and take it away from you!”

Before they had time to think up arguments in answer anti ways of circumventing him, before their hot indignation had cooled and set as stubborn resistance, he offered his gambit. He produced another layout for a propaganda campaign—an entirely different sort.

THIS TIME the board of directors was to be built up, not torn down. All of the same techniques were to be used; behind-the-scenes feature articles with plenty of human interest would describe the functions of the company, describe it as a great public trust, administered by patriotic, unselfish statesmen of the business world. At the proper point in the campaign, the Harper-Erickson fuel would be announced, not as a semiaccidental result of the initiative of two employees, but as the long-expected end product of years of systematic research conducted under a fixed policy of the board of directors, a policy growing naturally out of their humane determination to remove forever the menace of explosion from even the sparsely settled Arizona desert.

No mention was to be made of the danger of complete, planet-embracing catastrophe.

Lentz discussed it. He dwelt on the appreciation that would be due them from a grateful world. He invited them, to make a noble sacrifice and, with subtle misdirection, tempted them to think of themselves as heroes. He deliberately played on one of the most deep-rooted of simian instincts, the desire for approval from one's kind, deserved or not.

All the while he was playing for time, as he directed his attention from one hard case, one resistant mind, to another. He soothed and he tickled and he played on personal foibles. For the benefit of the timorous and the devoted family men, he again painted a picture of the suffering, death and destruction that might result from their well-meant reliance on the unproved and highly questionable predictions of Destry's mathematics. Then he described in glowing detail a picture of a world free from worry but granted almost unlimited power, safe power from an invention which was theirs for this one small concession.

IT WORKED. They did not reverse themselves all at once, but a committee was appointed to investigate the feasibility of the proposed spaceship power plant. By sheer brass Lentz suggested names for the committee and Dixon confirmed his nominations, not because he wished to, particularly, but because he was caught off guard and could not think of a reason to refuse without affronting those colleagues.

The impending retirement of King was not mentioned by either side. Privately, Lentz felt sure that it never would be mentioned.

It worked, but there was left much to do. For the first few days after the victory in committee, King felt much elated by the prospect of an early release from the soul-killing worry. He was buoyed up by pleasant demands of manifold new administrative duties. Harper and Erickson were detached to Goddard Field to collaborate with the rocket engineers there in design of firing chambers, nozzles, fuel stowage, fuel metering and the like. A schedule had to be worked out with the business office to permit as much power of the bomb as possible to be diverted to making atomic fuel, and a giant combustion chamber for atomic fuel had to be designed and ordered to replace the bomb itself during the interim between the time it was shut down on Earth and the later time when sufficient local, smaller plants could be built to carry the commercial load. He was busy.

When the first activity had died down and they were settled in a new routine, pending the shutting down of the bomb and its removal to outer space, King suffered an emotional reaction. There was, by then, nothing to do but wait, and tend the bomb, until the crew at Goddard Field smoothed out the bugs and produced a space-worthy rocketship.

They ran into difficulties, overcame them, and came across more difficulties. They had never used such high reaction velocities; it took many trials to find a nozzle shape that would give reasonably high efficiency. When that was solved, and success seemed in sight, the jets burned out on a time-trial ground test. They were stalemated for weeks over that hitch.

Back at the power plant Superintendent King could do nothing but chew his nails and wait. He had not even the release of running over to Goddard Field to watch the progress of the research, for, urgently as he desired to, he felt an even stronger, an overpowering compulsion to watch over the bomb more lest it—heartbreakingly!—blow up at the last minute.

He took to hanging around the control room. He had to stop that; his unease communicated itself to his watch engineers; two of them cracked up in a single day—one of them on watch.

He must face the fact—there had been a grave upswing in psychoneurosis among his engineers since the period of watchful waiting had commenced. At first; they had tried to keep the essential facts of the plan a close secret, but it had leaked out, perhaps through some member of the investigating committee. He admitted to himself now that it had been a mistake ever to try to keep it secret—Lentz had advised against it, and the engineers not actually engaged in the change-over were bound to know that something was up.

He took all of the engineers into confidence at last, under oath of secrecy. That had helped for a week or more, a week in which they were all given a spiritual lift by the knowledge, as he had been. Then it had worn off, the reaction had set in, and the psychological observers had started disqualifying engineers for duty almost daily. They were even reporting each other as mentally unstable with great frequency; he might even be faced with a shortage of psychiatrists if that kept up, he thought to himself with bitter amusement. His engineers were already standing four hours in every sixteen. If one more dropped out, he'd put himself on watch. That would be a relief, to tell himself the truth.

Somehow, some of the civilians around about and the nontechnical employees were catching on to the secret. That mustn't go on—if it spread any farther there might be a nation-wide panic. But how the hell could he stop it? He couldn't.

He turned over in bed, rearranged his pillow, and tried once more to get to sleep. No soap. His head ached, his eyes were balls of pain, and his brain was a ceaseless grind of useless, repetitive activity, like a disk recording stuck in one groove.

God! This was unbearable! He wondered if he were cracking up—if he already had cracked up. This was worse, many times worse, than the old routine when he had simply acknowledged the danger and, tried to forget it as much as possible. Not that the bomb was any different—it was this five-minutes-to-armistice feeling, this waiting for the curtain to go up, this race against time with nothing to do to help.

He sat up, switched on his bed lamp, and looked at the clock. Three thirty. Not so good. He got up, went into his bathroom, and dissolved a sleeping powder in a glass of whiskey and water, half and half. He gulped it down and went back to bed. Presently he dozed off.

HE WAS running, fleeing down a long corridor. At the end lay safety—he knew that, but he was so utterly exhausted that he doubted his ability to finish the race. The thing pursuing him was catching up; he forced his leaden, aching legs into greater activity. The thing behind him increased its pace, and actually touched him. His heart stopped, then pounded again. He became aware that he was screaming, shrieking in mortal terror.

But he had to reach the end of that corridor; more depended on it than just himself. He had to. He had to! *He had to!*

Then the sound hit him, and he realized that he had lost, realized it with utter despair and utter, bitter defeat. He had failed; the bomb had blown up.

THE SOUND was the alarm going off; it was seven o'clock. His pajamas were soaked, dripping with sweat, and his heart still pounded. Every ragged nerve throughout his body screamed for release. It would take more than a cold shower to cure this case of the shakes.

He got to the office before the janitor was out of it. He sat there, doing nothing, until Lentz walked in on him two hours later. The psychiatrist came in just as he was taking two small tablets from a box in his desk.

"Easy . . . easy, old man," Lentz said in a slow voice. "What have you there?" He came around and gently took possession of the box.

"Just a sedative."

Lentz studied the inscription on the cover. "How many have you had today?"

"Just two, so far."

"You don't need a sedative; you need a walk in the fresh air. Come, take one with me."

"You're a fine one to talk—you're smoking a cigarette that isn't lighted!"

"Me? Why, so I am! We both need that walk. Come."

HARPER arrived less than ten minutes after they had left the office. Steinke was not in the outer office. He walked on through and pounded on the door of King's private office, then waited with the man who accompanied him—a hard young chap with an easy confidence to his bearing. Steinke let them in.

Harper brushed on past him with a casual greeting, then checked himself when he saw that there was no one else inside.

"Where's the chief?" he demanded.

"Gone out. Should be back soon."

"I'll wait. Oh—Steinke, this is Greene. Greene—Steinke."

The two shook hands, "What brings you back, Cal?" Steinke asked, turning back to Harper.

"Well . . . I guess it's all right to tell you—"

The communicator screen flashed into sudden activity, and cut him short. A face filled most of the frame. It was apparently too close to the pickup, as it was badly out of focus. "Superintendent!" it yelled in an agonized voice. "The bomb—"

A shadow flashed across the screen, they heard a dull *smack*, and the face slid out of the screen. As it fell it revealed the control room behind it. Someone was down on the floor plates, a nameless heap. Another figure ran across the field of pickup and disappeared.

Harper snapped into action first. "That was Silard!" he shouted, "in the control room! Come on, Steinke!" He was already in motion himself.

Steinke went dead-white, but hesitated only an unmeasurable instant. He pounded sharp on Harper's heels. Greene followed without invitation, in a steady ran that kept easy pace with them.

They had to wait for a capsule to unload at the tube station. Then all three of them tried to crowd into a two-passenger capsule. It refused to start, and moments were lost before Greene piled out and claimed another car.

The four-minute trip at heavy acceleration seemed an interminable crawl. Harper was convinced that the system had broken down, when the familiar click and sigh announced their arrival at the station under the bomb. They jammed each other trying to get out at the same time.

The lift was up; they did not wait for it. That was unwise; they gained no time by it, and arrived at the control level out of breath. Nevertheless, they speeded up when they reached the top, zigzagged frantically around the outer shield, and burst into the control room.

The limp figure was still on the floor, and another, also inert, was near it. The second's helmet was missing.

The third figure was bending over the trigger. He looked up as they came in, and charged them. They hit him together, and all three went down. It was two

to one, but they got in each other's way. The man's heavy armor protected him from the force of their blows. He fought with senseless, savage violence.

Harper felt a bright, sharp pain; his right arm went limp and useless. The armored figure was straggling free of them.

There was a shout from somewhere behind them, "Hold still!"

Harper saw a flash with the corner of one eye, a deafening crack hurried on top of it, and re-echoed painfully in the restricted space.

The armored figure dropped back to his knees, balanced there, and then fell heavily on his face. Greene stood in the entrance, a service pistol balanced in his hand.

Harper got up and went over to the trigger. He tried to reduce the dampening adjustment, but his right hand wouldn't carry out his orders, and his left was too clumsy. "Steinke," he called, "come here! Take over."

Steinke hurried up, nodded as he glanced at the readings, and set busily to work.

IT WAS THUS that King found them when he bolted in a very few minutes later.

"Harper!" he shouted, while his quick glance was still taking in the situation. "What's happened?"

Harper told him briefly. He nodded. "I saw the tail end of the fight from my office—Steinke!" He seemed to grasp for the first time who was on the trigger. "He can't manage the controls—" He hurried toward him.

Steinke looked up at his approach. "Chief!" he called out. "Chief! *I've got my mathematics back!*"

King looked bewildered, then nodded vaguely, and let him be. He turned back to Harper. "How does it happen you're here?"

"Me? I'm here to report—we've done it, chief!"

"Eh?"

"We've finished; it's all done. Erickson stayed behind to complete the power-plant installation on the big ship. I came over in the ship we'll use to shuttle between Earth and the big ship, the power plant. Four minutes from Goddard Field to here in her. That's the pilot over there." He pointed to the door, where Greene's solid form partially hid Lentz.

"Wait a minute. You say that everything is ready to install the bomb in the ship? You're sure?"

"Positive. The big ship has already flown with our fuel—longer and faster than she will have to fly to reach station in her orbit; I was in it—out in space, chief! We're all set, six ways from zero."

King stared at the dumping switch, mounted behind glass at the top of the instrument board. "There's fuel enough," he said softly, as if he were alone and speaking only to himself; "there's been fuel enough for weeks."

He walked swiftly over to the switch, smashed the glass with his fist, and pulled it.

The room rumbled and shivered as two and a half tons of molten, massive metal, heavier than gold, coursed down channels, struck against baffles, split into a dozen streams, and plunged to rest in leaden receivers—to rest, safe and harmless, until it should be reassembled far out in space.