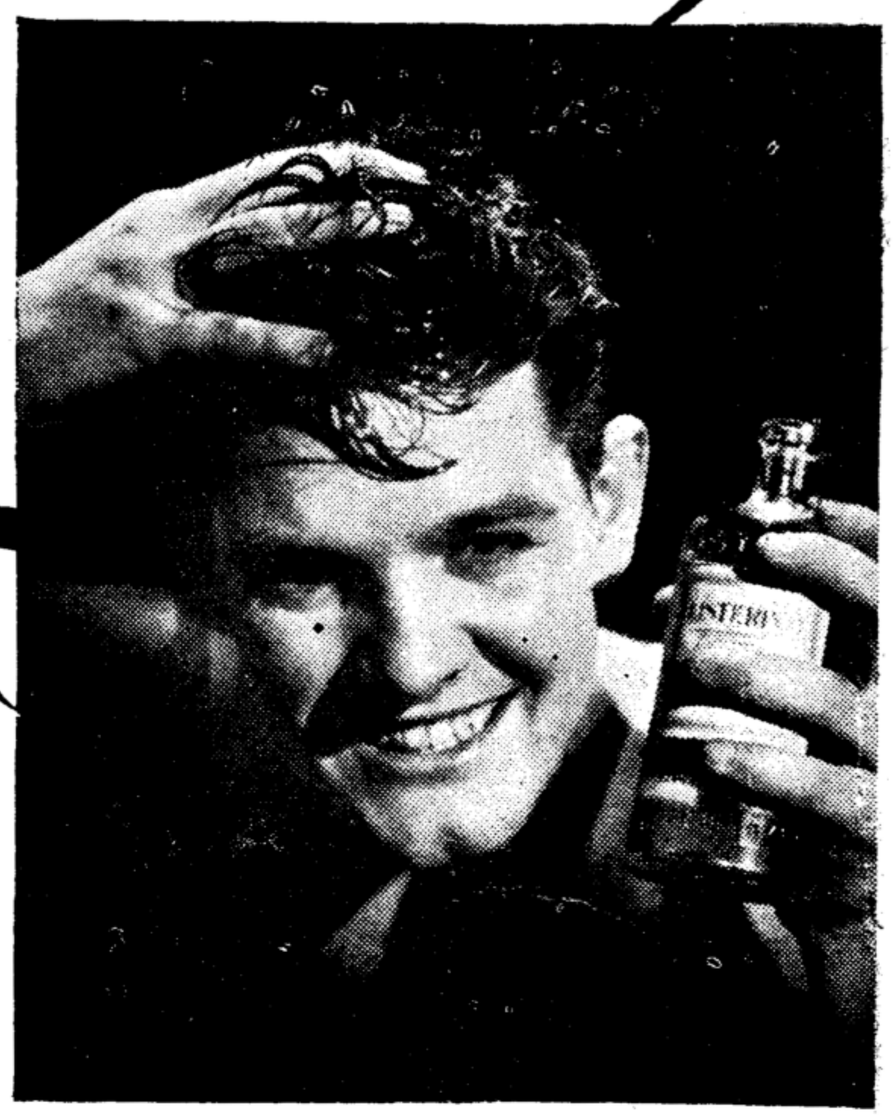
ASTOUNDING

SCIENCE-FICTION 20¢

A STREET & SMITH PUBLICATION AUG. 1939

THE LUCK OF IGNATZ by Lester Del Rey

GET RID OF DANDRUFF WITH LISTERINE



Reaches and kills Pityrosporum ovale, which causes dandruff . . . scalp becomes cleaner, fresher, healthier

Don't go around with a case of dandruff that humiliates you and disgusts others. Start using Listerine Antiseptic and massage once a day at least. Twice a day is better.

This amazingly delightful treatment has proved successful in laboratory and clinic. Countless men and women use no other.

Listerine Antiseptic, famous for 25 years as a mouth wash and gargle, succeeds so brilliantly in controlling dandruff because it gives scalp, hair, and hair follicles an antiseptic bath which removes ugly flakes and kills the queer, bottle-shaped germ (Pityrosporum ovale) which causes dandruff.

Start with Listerine Antiseptic and continue the treatments regularly. Results will delight and amaze you. No other remedy that we know of has such a clinical record of success in such a large majority of cases.

Even after dandruff has disappeared, it is wise to massage with Listerine Antiseptic at regular intervals to guard against reinfection.

Lambert Pharmacal Company
St. Louis, Mo.

THE TREATMENT

MEN: Douse Listerine Antiseptic on the scalp *at least once a day*. **WOMEN:** Part the hair at various places, and apply Listerine Antiseptic right along the part with a medicine dropper, to avoid wetting the hair excessively.

Always follow with vigorous and persistent massage with fingers or a good hair brush. But don't expect overnight results, because germ conditions cannot be cleared up that fast.

Genuine Listerine Antiseptic is guaranteed not to bleach the hair or affect texture.

LISTERINE ANTISEPTIC THE *PROVED* TREATMENT FOR DANDRUFF

A Money-Making Opportunity

for Men of Character

EXCLUSIVE FRANCHISE FOR AN INVENTION EXPECTED TO REPLACE A MULTI-MILLION-DOLLAR INDUSTRY

Costly Work Formerly "Sent Out" by Business Men Now Done by Themselves at a Fraction of the Expense

This is a call for men everywhere to handle exclusive agency for one of the most unique business inventions of the day.

Forty years ago the horse and buggy business was supreme—today almost extinct. Twenty years ago the phonograph industry ran into many millions—today practically a relic. Only a comparatively few foresighted men saw the fortunes ahead in the automobile and the radio. Yet irresistible waves of public buying swept these men to fortune, and sent the buggy and the phonograph into the discard. So are great successes made by men able to detect the shift in public favor from one industry to another.

Now another change is taking place. An old established industry—an integral and important part of the nation's structure—in which millions of dollars change hands every year—is in thousands of cases being replaced by a truly astonishing, simple invention which does the work better—more reliably—AND AT A COST OFTEN AS LOW AS 2% OF WHAT IS ORDINARILY PAID! It has not required very long for men who have taken over the rights to this valuable invention to do a remarkable business, and show earnings which in these times are almost unheard of for the average man.

EARNINGS

One man in California earned over $1,600 per month for three months—close to $5,000 in 90 days' time. Another writes from Delaware—"Since I have been operating (just a little less than a month of actual selling) and not the full day at that, because I have been getting organized and had to spend at least half the day in the office; counting what I have sold outright and on trial, I have made just a little in excess of one thousand dollars profit for one month." A man working small city in N. Y. State made $10,805 in 9 months. Texas man nets over $300 in less than a week's time. Space does not permit mentioning here more than these few random cases. However, they are sufficient to indicate that the worthwhile future in this business is coupled with immediate earnings for the right kind of man. One man with us has already made over a thousand sales on which his earnings ran from $5 to $60 per sale and more. A great deal of this business was repeat business. Yet he had never done anything like this before coming with us. That is the kind of opportunity this business offers. The fact that this business has attracted to it such business men as former bankers, executives of businesses—men who demand only the highest type of opportunity and income—gives a fairly good picture of the kind of business this is. Our door is open, however, to the young man looking for the right field in which to make his start and develop his future.

Not a "Gadget"— Not a "Knick-Knack"—

but a valuable, proved device which has been sold successfully by business novices as well as seasoned veterans.

Make no mistake—this is no novelty—no flimsy creation which the inventor hopes to put on the market. You probably have seen nothing like it yet—perhaps never dreamed of the existence of such a device—yet it has already been used by corporations of outstanding prominence—by dealers of great corporations—by their branches—by doctors, newspapers, publishers—schools—hospitals, etc., etc., and by thousands of small business men. You don't have to convince a man that he should use an electric bulb to light his office instead of a gas lamp. Nor do you have to sell the same business man the idea that some day he may need something like this invention. The need is already there—the money is usually being spent right at that very moment—and the desirability of saving the greatest part of this expense is obvious immediately.

Some of the Savings You Can Show

You walk into an office and put down before your prospect a letter from a sales organization showing that they did work in their own office for $11 which formerly could have cost them over $200. A building supply corporation pays our man $70, whereas the bill could have been for $1,600! An automobile dealer pays our representative $15, whereas the expense could have been over $1,000. A department store has expense of $88.60, possible cost if done outside the business being well over $2,000. And so on. We could not possibly list all cases here. These are just a few of the many actual cases which we place in your hands to work with. Practically every line of business and every section of the country is represented by these field reports which hammer across dazzling, convincing money-saving opportunities which hardly any business man can fail to understand.

Profits Typical of the Young, Growing Industry

Going into this business is not like selling something offered in every grocery, drug or department store. For instance, when you take a $7.50 order, $5.83 can be your share. On $1,500 worth of business, your share can be $1,167.00. The very least you get as your part of every dollar's worth of business you do is 67 cents—on ten dollars' worth $6.70, on a hundred dollars' worth $67.00—in other words two thirds of every order you get is yours. Not only on the first order—but on repeat orders—and you have the opportunity of earning an even larger percentage.

This Business Has Nothing to Do With House to House Canvassing

Nor do you have to know anything about high-pressure selling. "Selling" is unnecessary in the ordinary sense of the word. Instead of hammering away at the customer and trying to "force" a sale, you make a dignified, business-like call, leave the installation—whatever size the customer says he will accept—at our risk, let the customer sell himself after the device is in and working. This does away with the need for pressure on the customer—it eliminates the handicap of trying to get the money before the customer has really convinced himself 100%. You simply tell what you offer, showing proof of success in that customer's particular line of business. Then leave the invention without a dollar down. It starts working at once. In a few short days, the installation should actually produce enough cash money to pay for the deal, with profits above the investment coming in at the same time. You then call back, collect your money. Nothing is so convincing as our offer to let results speak for themselves without risk to the customer! While others fail to get even a hearing, our men are making sales running into the hundreds. They have received the attention of the largest firms in the country, and sold to the smallest businesses by the thousands.

No Money Need Be Risked

in trying this business out. You can measure the possibilities and not be out a dollar. *If you are looking for a business that is not overcrowded*—a business that is just coming into its own—on the upgrade, instead of the downgrade—a business that offers the buyer relief from a burdensome, but unavoidable expense—a business that has a prospect practically in every office, store, or factory into which you can set foot—regardless of size—*that is a necessity* but does not have any price cutting to contend with as other necessities do—that because you control the sales in exclusive territory is your own business—*that pays more on some individual sales than many men make in a week and sometimes in a month's time*—if such a business looks as if it is worth investigating, *get in touch with us at once* for the rights in your territory—don't delay—because the chances are that if you do wait, someone else will have written to us in the meantime—and if it turns out that you were the better man—we'd both be sorry. So for convenience, *use the coupon below*—but send it right away—or wire if you wish. But do it now. *Address*

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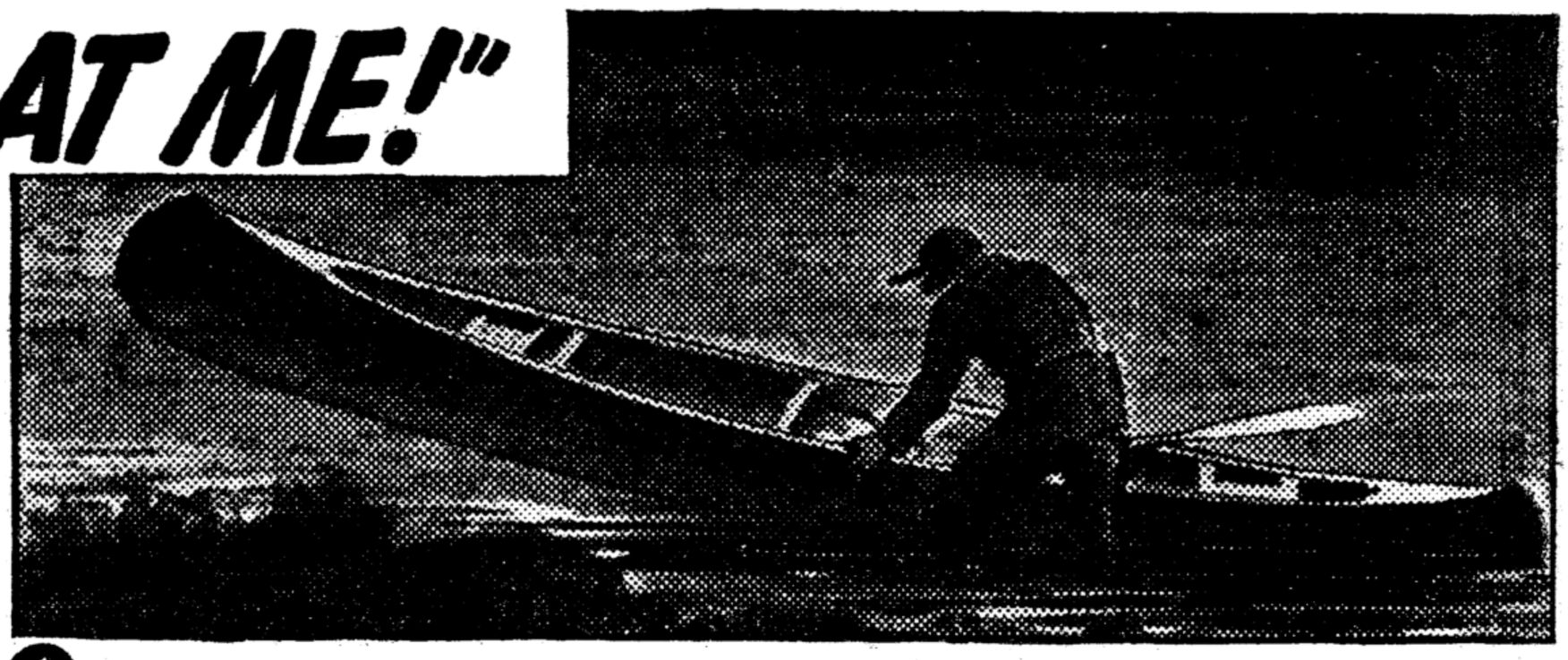
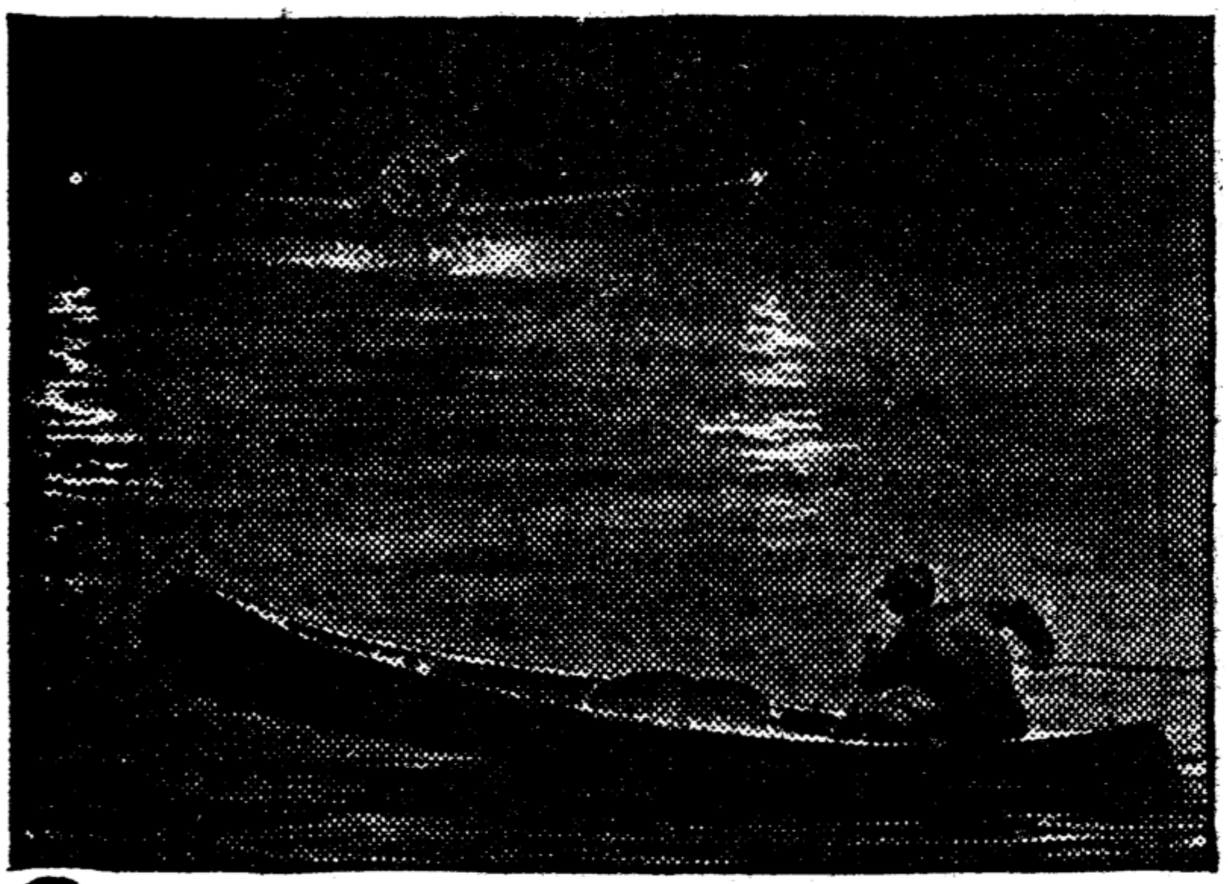
"THE HURTLING MONSTER ROARED STRAIGHT AT ME!"

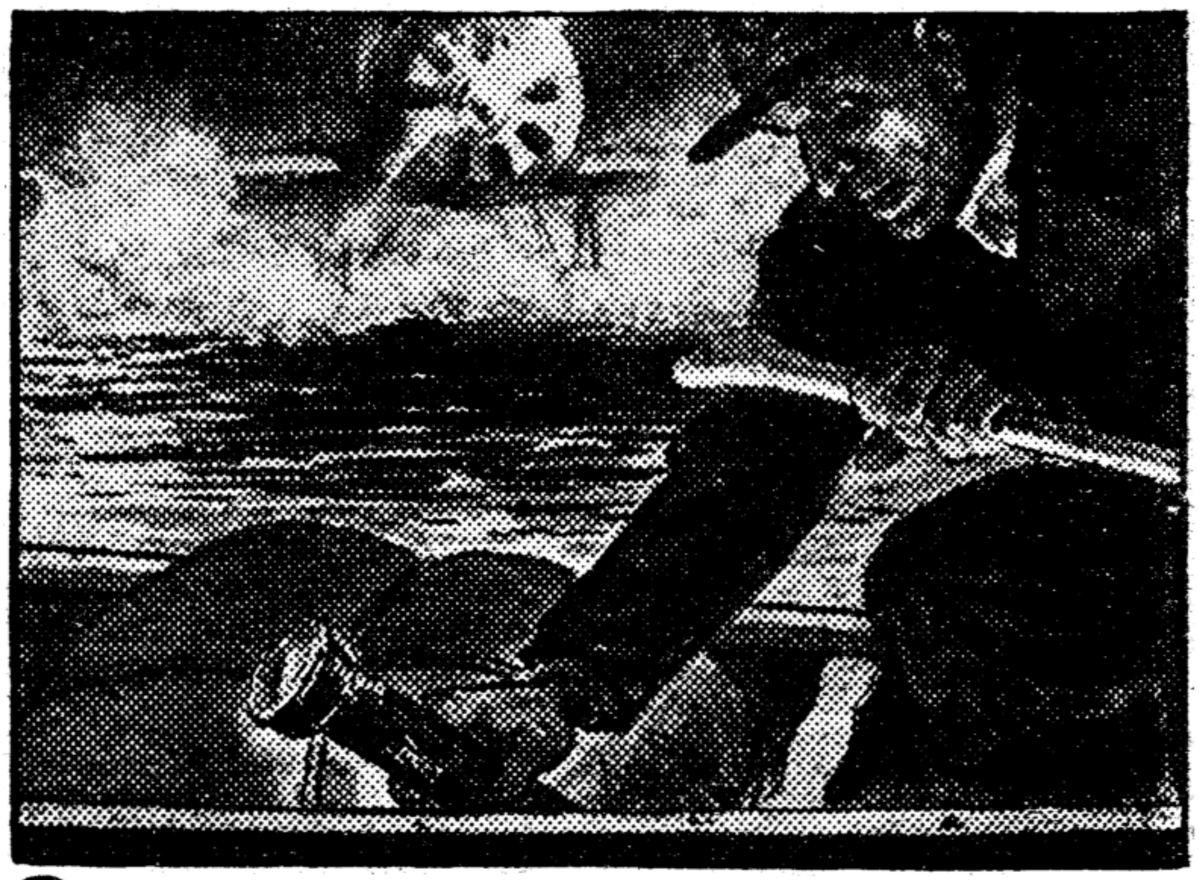
F. L. BROWNELL
Licensed Guide
Adirondack Forest Preserve



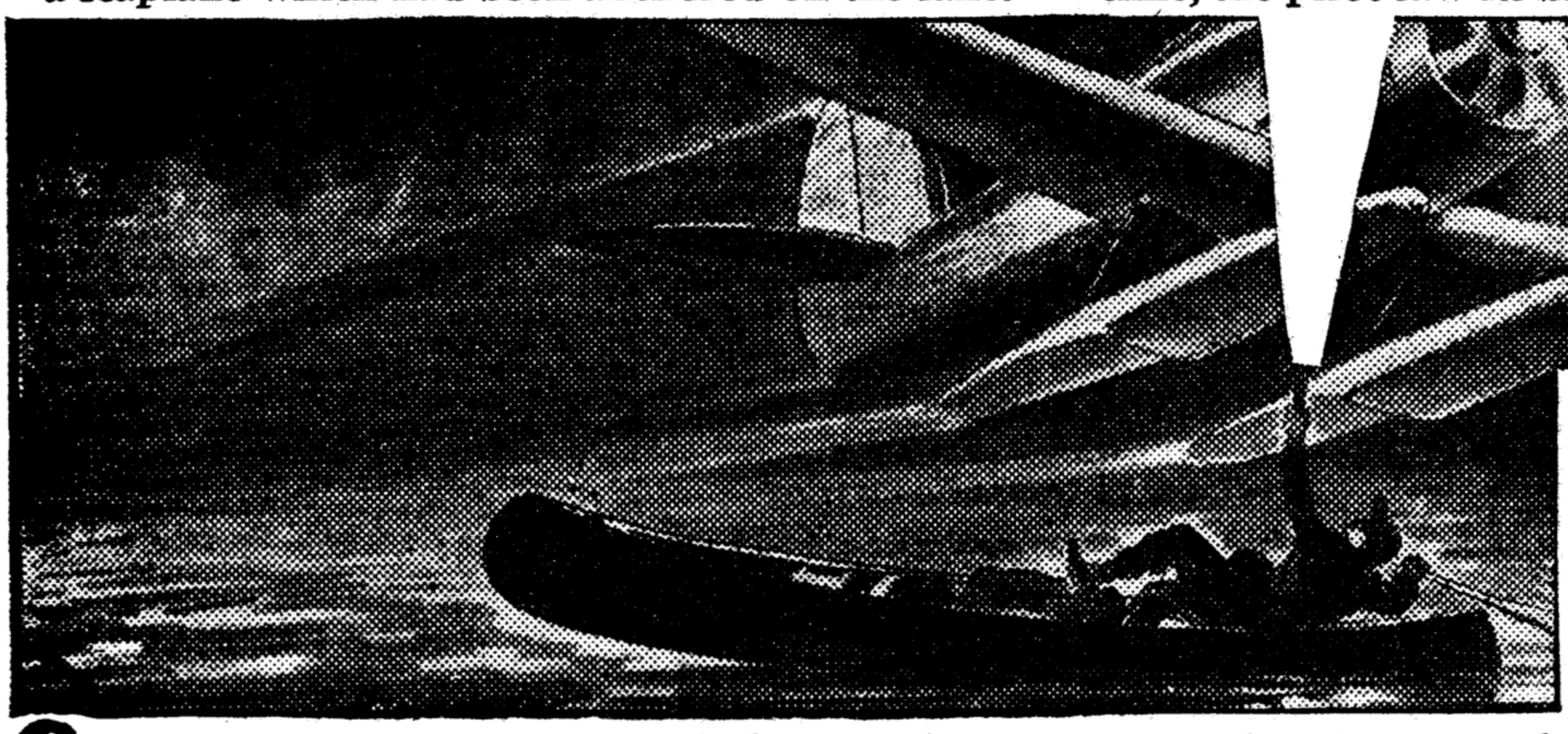
1 **"One dark night,"** writes Mr. Brownell, "I had to cross Fourth Lake in a canoe. The utter silence gave one the feeling of being a million miles from civilization.



2 **"About halfway across,** the night was shattered by the roar of a powerful motor. Two specks of light, which rapidly grew larger, came towards me —a seaplane which had been anchored on the lake!

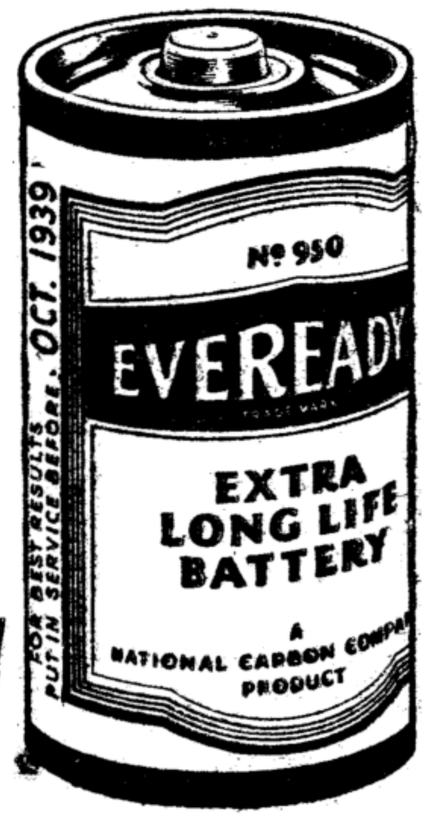


3 **"The hurtling monster** was roaring straight for me! The pilot couldn't hear my shouts. I made a frantic grab for the flashlight beside me. Just in time, the pilot saw its bright flash.



4 **"The plane shot aside** as it took the air, missing my canoe by what seemed like inches! I think I can truthfully say that those 'Eveready' *fresh* DATED batteries saved my life. I'll tell the world I'll never be without them in *my* flashlight. It just doesn't pay to take chances.

(*Signed*) *F. L. Brownell*"



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16

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INVENTION AND IMAGINATION

The first letter of the Science Discussions department is especially recommended to your attention. The point raised is, I think, of real interest to science-fiction readers, and brings up another point of equal interest.

Mr. van Arsdel asks that science-fiction writers think up more things civilization needs for inventors to work on, more basic needs.

Science-fictionists have done fairly well on thinking up needs and useful inventions-to-be-made. The lag comes, I feel, not there but in the inventors' tendency to reply to the suggestions "Uhmmm . . . very nice, but we can't do that, and we don't know enough yet to make it worth while looking for an answer."

Take the old science-fiction suggestion of a glass so tough a sledge hammer blow won't break it. Inventors replied to that one that glass was, unfortunately, a super-cooled liquid which was, inherently, and inevitably, too brittle for any such treatment.

We've got two answers to that now: tempered glass, which will resist an amazing blow, and actually bend considerably without breaking—but which shatters to tiny fragments if a pin-hole is made in the surface. And we have organic plastics which look like glass, but can be bent, sawed, twisted, molded—and struck with sledge hammers. The first type, the inventor can rightfully point out, isn't flexible glass at all—which is what science-fiction was talking of. And the second isn't glass.

Quite right. If we science-fiction authors had known exactly what twist to put on that we wouldn't have made a suggestion; we'd have gotten a patent.

Another point of delay is this: generally, science-fiction inventions are made by heroes who discover an underlying principle and, two days later, produce the perfected application. The Wright Brothers, in other words, should have built the Yankee Clipper as their second airplane model.

That was, at least, typical of the science-fiction of ten years ago. Today's authors tend to recognize that long and arduous—and undramatic!—period of delay and development. They take up their story after the great principles have been worked out, and most of the infinite multitude of accessory inventions made. The hero makes one small, but vital invention—and therein lies a story.

There was a wonderful glass-blowing machine invented and worked out and built. But it wouldn't blow good bottles. Then someone invented a small hole in the blowpipe, and presto! the machine worked. That can happen. But that Professor Abercombie can discover, invent, and perfect a spaceship in a month is exceedingly dubious. Vic Phillips in "Maiden Voyage" had his hero invent one new, small detail—a new arrangement of known apparatus—that was of enormous importance. That's plausible. He'd skipped the centuries of small accretion of one new gadget added to another small mechanism that went to make the previous machine possible.

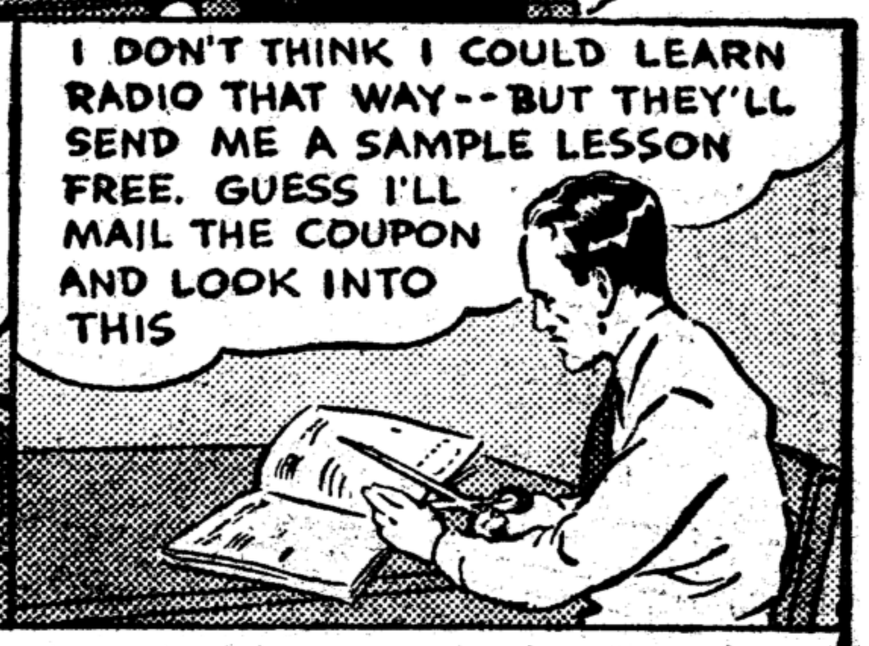
Science-fiction, to be dramatic, must be interesting. It skips the details—and arrives at flexible glass, or completely self-controlling airplanes or thinking robots.

Thinking robots! We've been working on them for centuries, as Leo Vernon's article "Tools for Brains" told! It can be done—and will be done. But not by one man, in one year. But one year, one man will add the final, finishing touch.

Science-fiction has produced a multitude of suggestions for things the future needs. The thing that is lacking is the thirty-odd years of development that come between Kitty Hawk and the Yankee Clipper.

The Editor.

HOW A FREE LESSON STARTED BILL ON THE WAY TO A GOOD RADIO JOB



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I'll send a sample lesson FREE

J. E. SMITH, President
National Radio Institute
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Clip the coupon and mail it. I will prove I can train you at home in your spare time to be a RADIO EXPERT. I will send you my first lesson FREE. Examine it, read it, see how easy it is to understand—how practical I make learning Radio at home. Men without Radio or electrical knowledge become Radio Experts, earn more money than ever as a result of my Training.

Why Many Radio Experts Make $30, $50, $75 a Week

Radio broadcasting stations employ engineers, operators, station managers and pay well for trained men. Fixing Radio sets in spare time pays many $200 to $500 a year—full time jobs with Radio jobbers, manufacturers and dealers as much as $30, $50, $75 a week. Many Radio Experts open full or part time Radio sales and repair businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, in good-pay jobs with opportunities for advancement. Automobile, police, aviation, commercial Radio, loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I trained have good jobs in these branches of Radio. Read how they got their jobs. Mail coupon.

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J. E. SMITH, President
National Radio Institute, Dept. 9GD,
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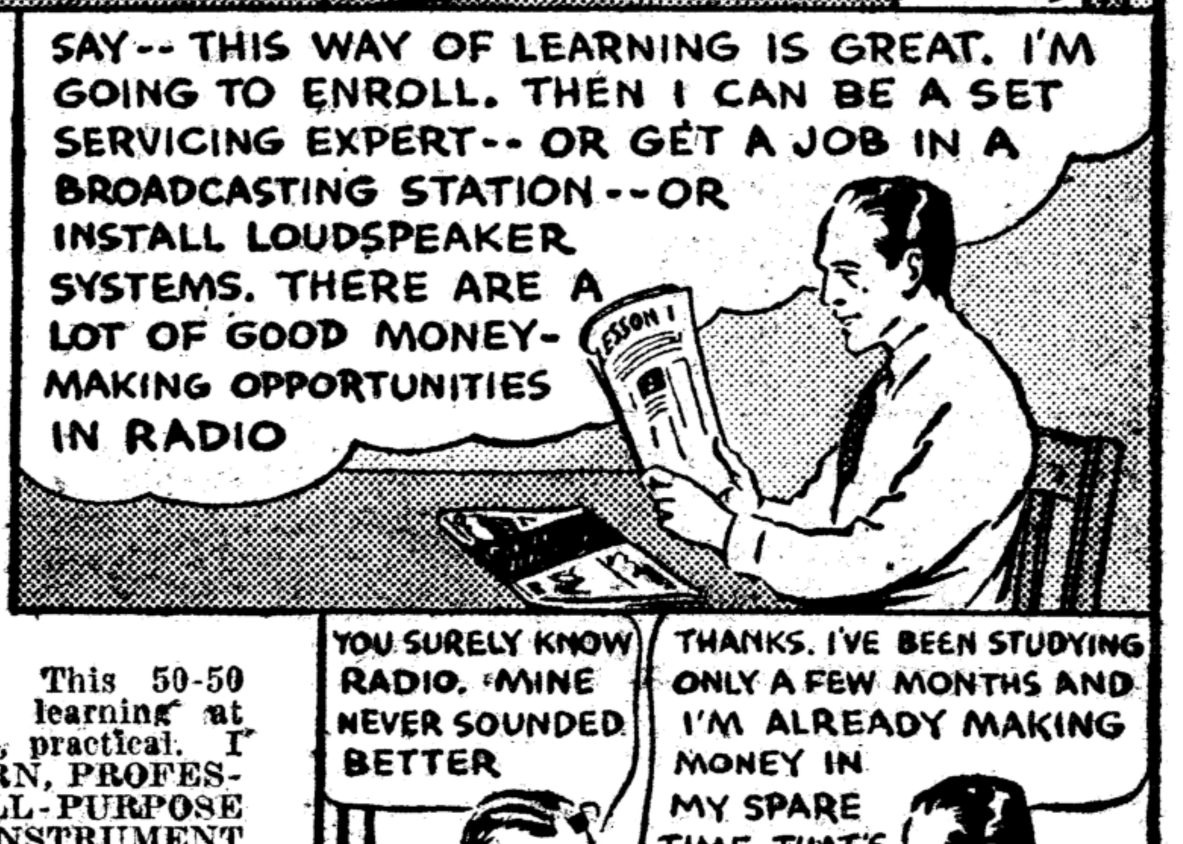

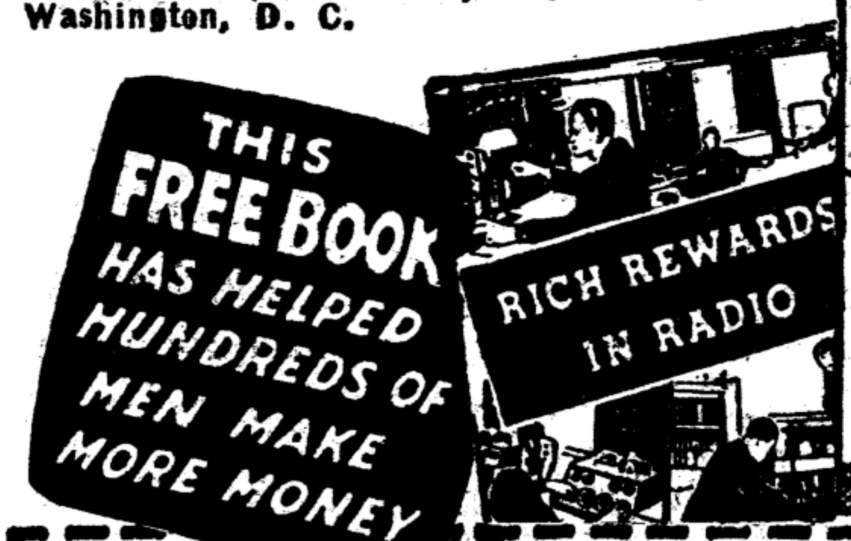

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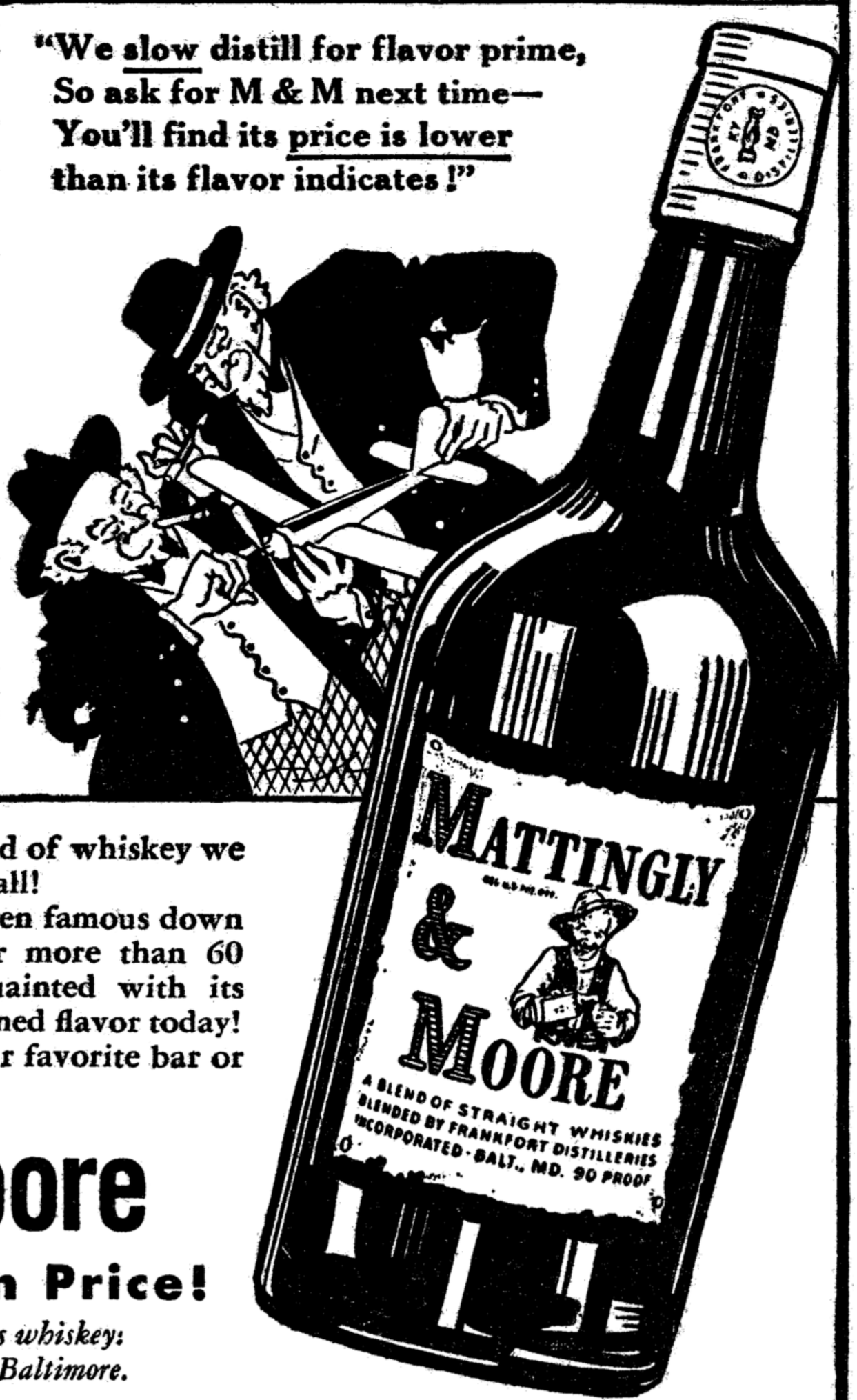

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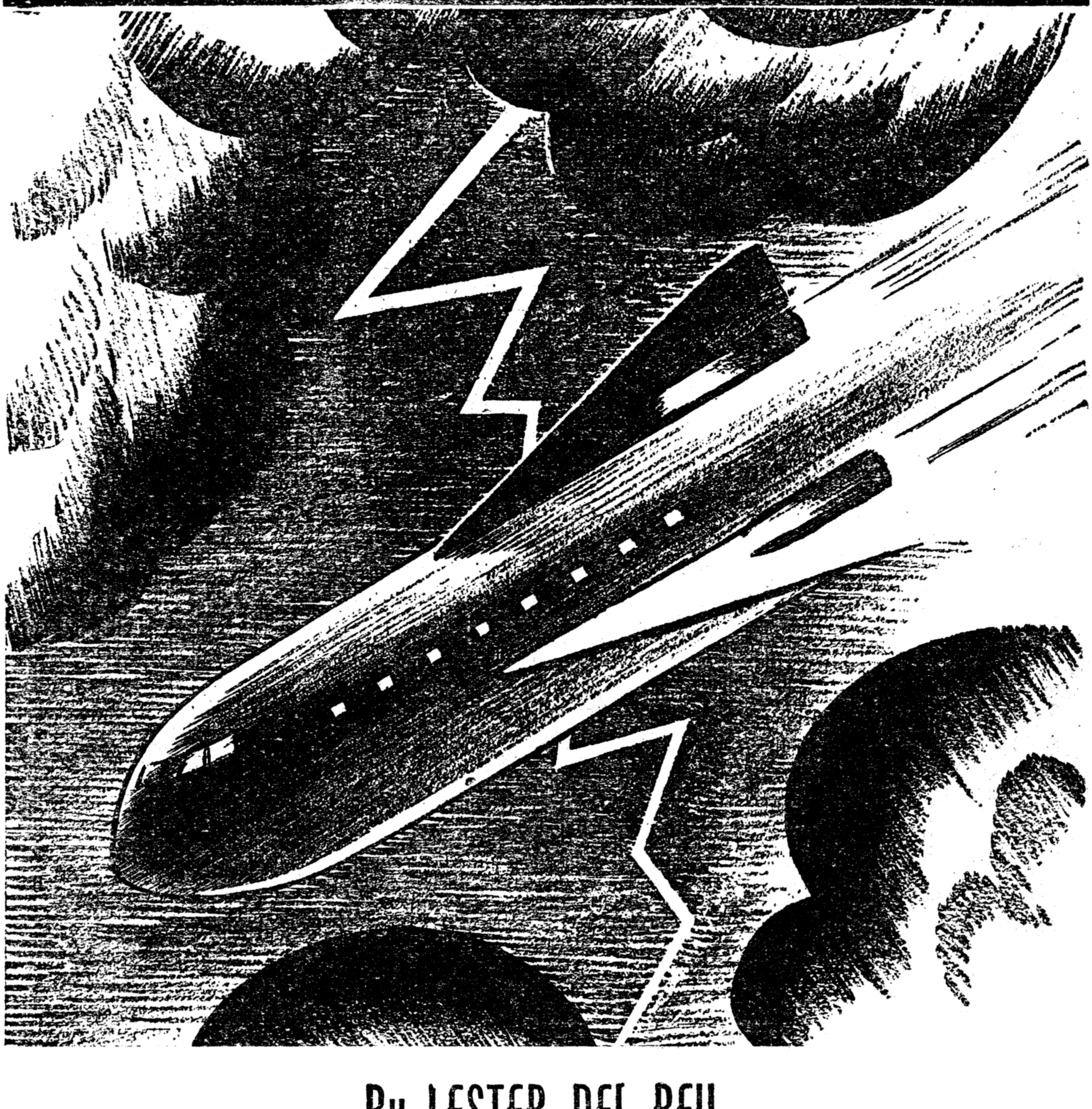
THE LUCK OF IGNATZ



By LESTER DEL REY

MAYBE it was superstition, but Ignatz knew it was all his fault. For the last three days, Jerry Lord had sat in that same chair, his eyes conjuring up a vision of red hair and a dimple on the wall, and there was nothing Ignatz could do about it.

He grumbled his unhappiness, dug his tail into the carpet, and shoved forward on his belly-plate until his antennae touched the Master's ankle. For the hundredth time he tried to mumble

human words, and failed. But Jerry sensed his meaning and reached down absently to rub the horn on his snout.

"Ignatz," the Master mumbled, "did I tell you Anne star-hops on the *Burgundy* tonight? Bound for South Venus." He sucked on his cold pipe, then tossed it aside in disgust. "Pete Durnall's to guide her through Hellonfire swamps."

It was no news to Ignatz, who'd heard nothing else for the last three days, but he rumbled sympathetically in his foghorn voice. In the rotten inferno north of Hellas, any man who knew the swamps could be a hero to a mudsucker. Even veteran spacemen were usually mudsuckers on Venus, and Anne was Earthbound up to now.

Ignatz knew those swamps—none better. He'd lived there some hundred odd years until the Master caught him for a mascot. Oh, the swamp animals were harmless enough, most of them, but Anne wouldn't think so when she saw them. She'd screamed the first time she saw him; even a Venusian *zloaht,* or snail-lizard, was horrible to an Earthman; the other fauna were worse.

But the memory of the swamps suggested heat to Ignatz. He crawled up the portable stove and plunked down into a pan of boiling water; after a few minutes, when the warmth took full effect, he relaxed comfortably on the bottom to sleep. Jerry'd have to solve his own problems, since he couldn't learn zloaht language. What was the sense of solving problems if he couldn't boast about it?

There was a thud and clank outside, and a chorus of shrieks rent the air. By the time Ignatz was fully awake, a man was pounding on the door, grumbling loudly. Jerry threw it open, and the hotel manager plunked in, face red and temper worse.

"Know what that was?" he shrieked. "Number two elevator broke the cable—brand-new it was, too. Stuck between floors, and we've got to cut through with a blow torch. Now!"

"So what? I didn't do it." The old weariness in Jerry's voice was all too familiar to Ignatz. He knew what was coming.

"No, you didn't do it; you didn't *do* it. But you were here." The red face turned livid, and the fat chest heaved convulsively. He threshed his fist in front of Jerry's face, and shrilled out in a quavering falsetto: "Don't think I haven't heard of you. I felt sorry for you, took you in for only double rates, and look what happens. Well, I'm through. Out you go—hear me? Out, now, at once!"

Jerry shrugged. "O. K." He watched with a detached interest as Ignatz climbed out of the pan, and dropped over onto the manager's leg. With a wild shriek of confused profanity, the man jerked free and out. He went scurrying down the hall, his fat hands rubbing at the burned flesh.

"You shouldn't have done that, Ignatz," Jerry remarked mildly. "He'll probably have blisters where you touched him. But it's done now, so go cool off and help me pack." He put a pan of cold water on the floor and began opening closets and dragging out clothes. Ignatz climbed into the water and let his temperature drop down to a safe limit, considering this latest incident ruefully.

NOT that there was anything novel about it; the only wonder was that they had been in the hotel almost a week before it happened. And it was all his fault; he never did anything, but he was there, and trouble followed blissfully after. Of course, Jerry Lord should have known better than to catch a snail-lizard, but he did it, and things started.

The luckiest man in the star fleet, the Master had been head tester for the new rocket models until the O. M. decided he needed a rest and sent him to Venus.

Any normal man would have been killed when the ship cracked up over the swamps, but Jerry came walking into Hellas with two hundred ounces of gold under one arm and Ignatz under the other.

Naturally, the Venusians had warned him. They knew, and had known for generations, that it was good luck to have a zloaht around in the swamps, but horribly bad outside. The members of Ignatz's tribe were plain Jonahs, back to the beginning. Ignatz knew it, too, and tried to get away; but by the time they were well out of the swamps, he liked the Master too well to leave.

To any other man, Ignatz would have spelled personal bad luck, with general misfortune left over. But Jerry's personal luck held out; instead of getting trouble himself, others around him were swamped with it. The test ships cracked up, one after another, while Jerry got away without a scratch. Too many cracked up, and the O. M. gave Jerry another vacation, this time a permanent one.

His reputation waxed great, and doors closed silently but firmly before him. "Sorry, Mr. Lord, we're not taking on new men this year." They weren't to be blamed; hadn't something gone wrong by the time he left the office—not just something, but everything? Nowadays, an ambulance followed casually wherever he went walking with Ignatz, and some innocent bystander usually needed it.

Then Jerry met Anne Barclay, and the inevitable happened. Anne was the O. M.'s daughter, and as cute a yard engine as ever strode down the training field of the Six World Spaceport. Jerry took one look at her, said "Ah," and developed a fever. He still had some of his money left, and he could dance, even if the orchestra always missed their cues when he was on the floor. By the time he'd known her three weeks, she was willing to say yes; that is, she was until the O. M. put her wise. Then she remembered that she'd lost the ring her mother had given her, had tooth trouble, sinus trouble, and a boil on her left shoulder, all since she met Jerry. With the O. M. helping her imagination along, she did a little thinking about what married life might lead to; they decided that a little trip to Venus, with Pete Durnall, the Old Man's favorite, was just the answer, and that Jerry could cool his heels and rot.

Not that they were superstitious, any more than all star-jumpers and their daughters were; Ignatz understood that. But when too many coincidences happen, it begins to look a bit shady. Now she was gone, or at least going, and Jerry was going out on his ear, from her life and from the hotel. Ignatz swore lustily in lizard language, and crawled out of the pan. He rolled over in a towel, then began helping Jerry pack—a simple thing, since most of Jerry's wardrobe rested comfortable in old Ike's pawnshop.

"We'll go to the dock," Jerry decided. "I'm practically broke, fellow, so we'll sleep in a shed or an outbuilding if we can slip past the watch. Tomorrow I'll look for work again."

He'd been looking for work for months, any work, but the only job he knew was handling the star-jumpers, or spaceships; and they had enough natural bad luck without adding Luckless Jerry to the crew. Ignatz wondered what the chances of finding open garbage pails around the dock were, but he followed meekly enough.

A RAW steam pipe led around the shed with the loose lock at the rear. It happened to be super-hot steam, so Ignatz's sleep was heavy and dreamless, and daylight came and went unknown. The first thing he knew was when Jerry knocked him down and dipped him in a cold puddle to wake him up. At least, it smelled like Jerry, though the face and clothes were all wrong.

The Master grinned down at Ignatz as the water fizzed and boiled. Over night, apparently, he had grown a beard, and his straight hair was a mass of ringlets. Over one eye a scar ran down to his mouth, and pulled his lips up into a rough caricature of a smile; and the face was rough and brown, while his clothes might have been pulled off a refuse truck.

"Pretty slick, eh, Ignatz?" he asked. "Old Ike fixed me up for my watch and ring." He picked the zloaht up and chucked him into a traveling bag. "We can't let them see you now, so you'll have to stay under cover till we hit berth."

Ignatz hooted questioningly, and Jerry chuckled. "Sure, we've got a job —keeping the bearings oiled on a space-hopper. Remember that old tramp who was sleeping in here last night? Well, he'd been a star-jumper till the weed hit him, and his papers were still clear. I got them for practically nothing, had Ike fix me up, and went calling today. Our luck's changed again. We're riding out tonight, bound for Venus!"

Ignatz grunted again. He might have known where they were bound for.

"Sure." Jerry was cocky again, banking on his luck. "Not another grunt from you, fellow. I can't take any chances on this trip."

The zloaht settled down on the clothes in the bag and chewed slowly on a piece of leather he'd found outside. Anything might happen now, but he had ideas of what that anything might be. The bag jerked and twisted as the Master slipped past the guards and out onto the rocket field where the hiss of rockets told Ignatz some ship was warming up, testing her exhaust. He stuck his eye to a crack in the bag and peered out.

It was an old freighter, but large and evidently well kept. They were moving the derricks back and battening down the hatches, so the cargo was all aboard. From the smell he decided they were carrying raisins, peanuts and chocolate, all highly prized by the spore prospectors on Venus. Venus grew little that equaled old Earth foods, and only the most concentrated rations could be carried by those wandering adventurers.

As he watched, Ignatz saw a big tanker run out on the tracks and the hose tossed over to fill the tanks with deuterium oxide for the atomic converters to burn into power; the berylium was already in, apparently. Mechanics were scurrying around, inspecting the long ion blast tubes, and the field was swarming with airscrew tugs ready to pull the big freighter up where her blast could shoot out harmlessly and her air fins get a grip on the air.

These big freighters were different from the sleek craft that carried the passengers; the triangles were always neatly balanced on their jets, but the freighter was helpless in the grip of a planet unless buoyed up by the tugs until she reached a speed where the stubby fins supported her.

Evidently the Master had made it barely in time, for the crew plank was being unhitched. He ran up it, presented his papers, and was ordered to his berth. As he turned to leave, there was a halloo from below, and the plank was dropped again. Blane, the freighter's captain, leaned over, swearing.

"Supercargo! Why can't he take a liner? All right, we'll wait for him twenty minutes." He stumped up the stairs to the conning turret, and words drifted down sulphurously. "Every damned thing's gone wrong on this trip. I'm beginning to think there's a Jonah in the crew."

Jerry waited to hear no more, but moved to his berth—a little tin hole in the wall, with a hard bunk, a pan of water, and a rod for his clothes. He tested the oxygen helmet carefully, nodded his satisfaction, and stretched out on the bunk.

"You stay there, Ignatz," he ordered, "and keep quiet. There might be an inspection. I'll let you out when I go on second shift. Anyway, there isn't a steam pipe in the hole, so it wouldn't do you any good."

THE PORT above was closing with a heavy bang. "Supercargo must have come up early. Wonder who he was? Must have been somebody important to hold Blane waiting for him—friend of the O. M.'s I guess." He grinned comfortably, then wiped it off his face as a shout came down the stairwell.

"Hey, down there! Bring up some tools, and make it snappy. The crew port's stuck, and we're taking off in five minutes."

Jerry swore, and Ignatz turned over with a disgruntled snort. "Well," the Master reflected, "at least I won't get the blame for it this time. But it's funny, all the same. Darned funny!"

Ignatz agreed. This promised to be an interesting voyage, if they ever reached Venus at all. If the Master had to keep a zloaht for a pet, he might have stayed on the ground where their necks would have been safe, instead of running off on this crazy chase after a girl. For once he was glad that Venus knew no sex—unless the incubator cows were called females.

Jerry let Ignatz out when he came back from shift. He was tired and grouchy, but nothing had gone wrong, in particular. There had been two minor accidents, and one of the tenders had his foot smashed by a loose coupling, but a certain amount of that had to be expected. At least no one had accused him of causing trouble.

"I found out who the supercargo is," he told the zloaht. "Nobody but the Old Man himself. So you lie low, and I'll keep out of his way. The old buzzard has eyes like a hawk, and nobody ever called his memory bad."

The works of Robert Burns were unknown to Ignatz, but he did know the gist of the part that goes: "The best laid schemes o' mice and men gang aft agley." He waited results with foreboding, and they came when Jerry's next shift was half through.

It was the O. M. himself who opened the door and turned to a pair of brawny wipers. "All right, bring him in here, and lock the door. I don't know who he is, and I don't care. We can find that out later; but I do know he isn't the man his card says. That fellow has been rotten with weed for ten years.

"And Captain Blane," he addressed the officer as they tossed Jerry on the bunk, "in the future inspect your men more carefully. I can't make a tour of inspection on every freighter, you know. Maybe there's no harm in him, but I don't want men working for me on fake cards."

As they locked the door and went down the hall, the captain's voice was placating, the O. M. raving in a soft voice that fooled nobody by its mildness. Ignatz crawled out from under the bunk, climbed up the rail, and nuzzled Jerry soothingly.

Jerry spat with disgust. "Oh, he came down, pottered around the generator room and wanted to see my card; said he didn't know any oiler with a scar. Then Hades broke loose, and he yelled for Blane. Anyway, he didn't recognize me. Thank the Lord Harry, you had enough sense to duck, or my goose would have been cooked."

Ignatz rooted around and rubbed the horn on his snout lightly against the Master's chest. Jerry grinned sourly.

"Sure, I know. We haven't sunk yet, and we're not going to. Go on away, fellow, and let me think. There must be some way of getting off this thing after we reach Venus."

Ignatz changed the "after" to "if" in his mind, but he crawled back dutifully and tried to sleep; it was useless. In half an hour Captain Blane rattled on

the door and stalked in, his face pointing to "Cold and stormy." There was an unpleasant suggestion in the way he studied Jerry.

"Young fellow," he barked, "if the Old Man didn't have plans for you, I'd rip you in three pieces and strew you all over this cabin. Call that damned zloaht of yours out and take off those whiskers, Jerry Lord."

The Master grunted, as a man does after a blow to the stomach. "What makes you think I'm Lord?"

"Think? There's only one Jonah that big in the star fleet. Since you came aboard, every blamed thing's been one big mess. The O. M. comes on board as supercargo, the port sticks, three men get hurt fitting a new injector, I find Martian sand worms in the chocolate, and the O. M. threatens to yank my stars. Don't tell me you're anyone else!" He poked under the bunk. "Come out of there, you blasted zloaht!"

Ignatz came, with a rueful honk at Jerry, who pulled his false beard anxiously. "Well, captain, what if I am? Does the O. M. know?"

"Of course not, and he better hadn't. If he found I'd shipped you with the crew, I'd never draw berth again. When we hit Venus, I'll try to let you out in a 'chute at the mile limit. Or would you rather stay and let the Old Man figure out ways and means?"

Jerry shook his head. "Let me out on your 'chute," he agreed hastily. "I don't care how, as long as I get free to Venus."

Blane nodded. "I'll catch hell anyway, but I'd rather not have you around when we land. I never did trust my luck when a ship breaks up." He pointed at Ignatz. "Keep that under cover. If the O. M. finds out who you are, I'll put you off in a lead suit, *without* a 'chute. Savvy, mister?"

Jerry savvied plenty. He motioned Ignatz back under the bunk, and moved over to the shelf where his grub lay. Blane turned to go. And then raw Hades broke loose.

THERE was a sick jarring, and a demon's siren seemed to go off in their ears. The shelf jumped across the room; Jerry hit the captain with his head. For a half second, there was complete silence, followed by bedlam, while the ship jerked crazily under their feet. Acting on instinct, both the captain and Master dashed for the oxygen helmet, and a private war started before either realized what had happened.

Jerry straightened up first. "That was the control engine," he yelled in Blane's ear. The man couldn't hear, but he caught the idea. "Get out of here and find out what happened."

There was no thought of prisoners. Jerry pounded along at the captain's heels, and Ignatz had only time to make a convulsive leap and slide down Jerry's neck under his jacket. Men were swarming down the stairwell and up from the main rocket rooms. A babble of voices blended with a shrilling of alarms and a thud of feet on cuproberyl decks.

The Old Man was in the engine room before them. "Blane! Blane— Hey, somebody find that lunkhead before these fools wreck the whole ship!"

Blane saluted roughly, his mouth open, his eyes darting about the wreck of the steering engine. "Ha-ha—what happened?"

One quick glance had told Jerry. "Which one of you oilers let the main bearing run dry?"

A wiper pointed silently to a shapeless hump of bones and assorted cold cuts. While eyes turned that way, Ignatz slipped out and pushed from sight between a post and wall that were still partly whole.

Jerry Lord's mouth was set as he swung to Blane. "Got a spare engine? No. Well, dismantle one of your gyrostabilizer engines and hook it up. Send

men to inspect what damage was done the controls. Get the doctor up here to look over these men who are still in one piece. Wake up, man!"

Blane shut his mouth slowly, wheeled back to the men and began shouting instructions, until some order came out of the milling mass of men. In the confusion, the O. M. hadn't noticed Jerry, but he swung to him now.

"Who let you out? Never mind; you're here. It's a good thing somebody had some sense, or that yellow-belly'd still be dreaming! Captain Blane, get that wreck out of here, put this prisoner to work. We can't waste time or men now. I'm going back to the control co-ordinators to inspect the damage."

Now that the shock of his first major accident was over, Blane snapped briskly into it. He glared at Jerry, but postponed it for later; Ignatz knew this was to be held against the Master, as all the other troubles were, and he mumbled uncomfortably.

With the engine in scattered parts, little dismantling was necessary. The men were cleaning the parts away, cutting such few bolts as were left in the base, and preparing the space for the new engine. The stabilizer motor came in, one part at a time, and Jerry oversaw its placement and assembly, set its governor, and hooked the controls to it as rapidly as the crew could cut away the bent rods and weld new ones in their place. In an emergency, no group of men on Earth can do the work that a space-crew can turn out in a scant half hour, and these were all seasoned star-jumpers; to them the lack of gravity was a help rather than a hindrance in the swift completion of the work.

BY THE TIME the O. M. was back, the walls were being welded over, the new engine was tuned, the controls hitched. and the captain was sweating and swearing, but satisfied that the work had been well done. Jerry came back from the stabilizer hold to report the motors retuned and set for the added load given by the loss of one of the five engines, with the juice feeding in evenly.

The Old Man motioned silently, his face blank and expressionless, and Blane gulped as he turned to follow. Jerry strung along without invitation, tucking Ignatz carefully out of sight under his clothes.

Back in the nerve center of the ship, the control integrators were a hopeless mess. The main thrust rods that coupled the control turret to the engine were still intact, but the cables and complex units of gears and eveners that formed the nearly human brain of the ship were ruined beyond possibility of repair.

The O. M.'s voice was almost purring, but his eyelids twitched. "Have you repairs, captain?"

"Some. We might be able to jury-rig part of it, but not enough to couple the major rockets to the control panel. That looks to me like a one-way ticket to hell." Under the stress of danger, the man had relapsed into a numb hopelessness.

"How many hours to Venus, and where's the danger point?"

"Sixty hours, and we either get control in ten, or we fall straight into the Sun. We're in Orbit C-3 now, and we'll miss Venus entirely."

"Not a chance to get repairs sent out in time," the O. M. muttered. "Well, I guess that's that."

Jerry pushed past the captain, saluted the O. M. quietly. "Beg pardon, sir, but it might be possible to control the ship manually from here, with observations relayed from the control turret."

Momentarily their eyes brightened, but only for a split second. "Not one man in a thousand knows the layout of the cables here, and the job would be physically impossible. I don't know whether this rod should be forced back or that one forward. When the old

Illustrated by Gilmore

"Hey! What's the—" said Jerry Lord.
"The Boss," grunted one of the pair. "He said arrest, so—"

manual controls were still in, we had them arranged logically in banks, but this is an uncharted confusion."

"I know the layout," Jerry offered evenly. "It's simply a question of being able to move around fast enough to co-ordinate the thrust rods." Yet he looked at the mass of rods, levers and cables with doubt large in his heart. It meant covering an eight-foot wall, and keeping the tangle of eveners clear in his mind every second of the time, though it might be done.

There was a snort from Blane, but the O. M. silenced it. "We have to believe in miracles now. It's our only chance. Are you sure you can do it, mister?"

"Fairly sure, sir."

"How many helpers?"

Jerry grinned sourly. "None. It's easier and surer doing it than telling others how to do it, and maybe having them mess things up. Has to be a one-man job."

"Right." There was grudging approval on the scowling face. "Blane, you take orders from him; get the wrecked parts out, uncouple the remaining automatics. You and the navigators will take turns relaying the chart data to this room—and it'd better be right. Get a phone hooked up at once, and put this man to work. If we get to Venus, he's free, no questions asked, and a good job waiting for him. If we don't, he won't need the job."

When the O. M. was gone, the captain shook his fist under Jerry's nose. "Jonah! If you hadn't been along, this wouldn't have happened. You'd better be good, *Mr.* Lord." He stopped suddenly, as a new thought hit him. "Do you realize that means sixty hours of steady, solid work down here?"

"Naturally, since your navigators never learned more than they had to:" Jerry shrugged with an entirely false optimism. "And you'll remember that hereafter every man on this ship will take orders from me, sir? I must insist on absolute co-operation."

"You'll get it, Jonah or not." Blane stuck out a hand. "I don't like your reputation, Lord, but I do like your guts. Good luck!"

In making an impressive exit, the captain forgot the oil on the floor; he executed a jerky half twist before his back hit the deck. Ignatz backed farther out of sight and prepared for the worst.

"Jonah!" said Blane, and it covered everything with no wasted syllables.

WITH the wreck carted out, the communications man came in, hooked up a phone and coupled it by a spring reel of wire to sponge-covered headphones. He handed over a chart of present position and estimated orbit, then cleared out.

Jerry cut in on the phone. "All clear?"

"Waiting for orders, sir. Stern rocket seven has a point-oh-six underblast you'll have to counteract, and the stabilizers only work three-five. Venus now in position—" The navigator rattled off his co-ordinates, and Jerry set them up in his head as he reached for the main blast rods.

"O. K. Leave orders I'm not to be bothered by anyone but the mess boy." He pulled Ignatz out, patted his back, and grinned. "The room's yours, fellow— Stand to blast!"

"Clear to blast, sir. All-l positions set! Trim and stow, all-l!" The time-honored call rang down the stairwell as Jerry threw the manuals and braced himself for gravity-on.

The freighter shook like a cat coming out of a bathtub, groaned and bucked sullenly, as the controls were thrown one at a time; reluctantly she settled down to business. For a bottom-blaster, she was a sweet old bus, put out with the craftsmanship of men who longed for the stars and took out that longing in building ships to carry others. Even with the overworked stabilizers and slight underblast she answered her helm

better than some of the new triangles. Jerry bit into her levers savagely at first, then gently as she became a part of him, hard to reach, yet sweet and honest.

The navigator was shouting down coordinates, drift ratios, and unneeded pep talk, and the O. M.'s voice came through occasionally, sounding almost pleasant. The crusty old scalawag had what it took, Jerry conceded; no hysteria or nonsense about him. Under such an example, the captain and first navigator took heart, and the second navigator was jaunty with hope, when he came on. Faith was dirt cheap in the conning turret at the moment; Jerry could have used more of it himself, but was careful not to show it in his voice.

The first ten hours were no worse than steady attention and driving work could make them, and he began to get the feel of the ship. His mind tuned in on the creaking of her girders, the sway of her deck, and the strange harmony that couples flesh to well-built metal. The pattern of the controls etched itself indelibly into his brain, short cuts came, and ways of throwing his combinations in less time and with less effort, until he became a machine integral with the parts he handled.

When food was brought down, he grinned confidently at the mess boy and snatched it in mouthfuls as the coordinates sent down and the movement felt sent him dancing across the room. Watching him, the boy grinned back, and snapped his fingers gleefully. Hop to Venus with ruined controls? A cinch!

Ignatz waited doubtfully, but nothing more seemed likely to happen. He honked hopefully—and an answering bark came out of the vent tubes. The exhaust blower went on noisily, but the current of cool air stopped.

Jerry cut in on the phone. "What happened?"

"Dust explosion in the filter chamber, sir. I'm afraid it'll take some time to fix it."

It did. While the hours passed, heat leaked in from the engine and refused to go out. Normal perspiration gave way to rivulets of sweat that tried to get in the Master's eyes and made his hands wet and slippery.

Ice and ice water, brought down at hourly intervals, helped, but did not alleviate the temperature. Men were working on the air ducts, but it promised to be a long job. Ignatz had secretly crawled up the maze of vent pipes to find the obstruction, nearly got lost, and came down without success.

WHEN the twenty-hour period was up, Jerry was rocking on his heels, cursing the heat with every labored breath. He wore ice packs on every safe place, and still couldn't keep cool. The blowers were working again, keeping a steady current of air moving, but the air was hot. Under the Master's shoes were heavy pads of rubberoid, and he wore stiff space mittens on his hands, but still the heat came through from the hot floor and control rods. A few more degrees would spell the limit.

Then the temperature reached a mark and held it. The heat seeping in and the air going out balanced, and Jerry settled down to a regular routine of ice packs and heat; even the air he breathed was filtered through an ice mask.

The phone buzzed and the O. M.'s voice came over. "One of the refrigerators overheated and burned a bearing. You'll have to cut down to half rations of ice."

"O. K." The Master stared thoughtfully at Ignatz, then caught him up and draped him over his shoulders. "Not enough ice, fellow. You like heat, but you'll have to cool me off. Come on, pal, show your stuff."

Ignatz did his best. He had the finest heat-regulating system on nine planets,

and he put it to work, soaking up the heat from Jerry's sweaty body, dissipating it out into the air. Jerry never understood how it was done, but he knew Ignatz could absorb heat or radiate it off at high efficiency; now the zloaht was absorbing on his flexible belly-plate and radiating from his back.

Jerry sighed his relief. "Ah, fine, fellow. You've got the ice packs beat three ways from Sunday." His eyes pulled shut and he relaxed against the control bars. Ignatz prodded him with the sharp end of his tail, waking him to his duties.

"Regular two-man crew we've got, fellow," the Master muttered. "You'll make me win this thing through yet, maybe." His beard was peeling off in the humid heat, and he pulled it away, along with the scar. The brown pigment had gone hours before.

But now things were letting up a little. The freighter had settled into the groove of her orbit, was balanced nicely, and required little more attention until they reached Venus. Jerry had an insulated chair rigged up and dropped into it when the pressure of the work would let him, while Ignatz listened for the opening buzz of the phone or watched gravely for a flash from the extension feed indicators. Fifteen minutes here, twenty there, once even a whole hour; Jerry's overworked system grabbed greedily at each minute, sucking up relief and rest like a dry sponge. If only the drugging, tiring heat would lift.

And then, miraculously, a shot of cold air *whooshed* out of the vent ports, and Jerry jerked up from his stupor. "They've got it, Ignatz; it's fixed!" He shivered gratefully under the draft, drew back from it while his body begged for coolness, afraid of too sudden a drop in temperature. "You can forget the heat, fellow; just wake me when I need it."

Now the air was dropping down smoothly, a degree every five minutes, and life seemed to flow back into the Master. Ignatz muttered softly and relaxed. The two-way heat control had been a heavy nervous strain on him, requiring hard mental discipline; he was thankful to fall back to normal.

The three-quarters mark came and went, with only fifteen hours ahead—and the hardest part of the job still to do. Under his breath Jerry was talking to himself, ordering his muscles as he might a crew of men, trying to forget the dull ache that found every muscle of his body, the hot acid pain in his head, the feeling of an expanding balloon against his brain. Another five hours, and they'd be teetering down through the heavy gravity zone, where every tube would have to be balanced until the tugs came to take over.

OLD MAN BARCLAY came down in place of the mess boy, a serious, worried O. M., but with a smile on his lips—until he saw Ignatz and Jerry's normal face. Then something hard shot into his eyes. He whistled.

"I had a hunch," he said softly. But his voice was even, his face relaxed. "You always were a fool, Jerry, even if you happen to be the best man that ever rode a star-hopper. This, and our cursed luck, should have told me. What is it—Anne?"

Jerry nodded, patted Ignatz back into place as the zloaht moved to avoid the O. M.'s look. "Anne," he agreed. He thrust back into the machinery as the navigator sent down fresh data, backed out, and faced the other squarely. "Well?"

"Of course." The old face never moved a muscle. "What I can't understand is how your luck can reach out ten million miles and hit another ship, though. Never mind, I'll tell you later—maybe."

Jerry dropped limply back into his chair, and the other moved over with a drink. Noting the trembling hands that lifted the glass, the Old Man's face

softened. "Too much work for one man, son. I used to be pretty much up on the layout here. Maybe I can spell you."

"Maybe. It's routine stuff now, Mr. Barclay. All you need are the feed controls and gyro-eveners banked together there." The Master pointed them out, one by one, while the O. M. nodded. "I'll have to take over in four, five hours though. Sure you can do it till then?"

"That much, yes." The O. M. tossed a blanket over the younger man and then moved over by the projecting feed bars. "Ever strike you as funny I came on this ship?"

"Didn't have time to think," said the Master.

Barclay squatted down on a beam, his eyes on the controls. "I don't do things without a purpose, Lord. Venus needs radium—needs it bad. They offer double price for three million dollars' worth, Earth price, when delivered at Hellas. But they want it quick, so it has to be sent in one load. You can't get insurance on that for a one-shipment cargo; too much risk. And no private company will ship it without insurance."

"So?"

"So I bought the radium on the market, had it stowed secretly with the chocolate—mutiny never happened, but it might—and came along to watch it. That represents my entire personal fortune. If it reaches Venus, I double my money; otherwise, I won't be there to worry about it."

He stopped, then went on in the same even voice. "That's why I could cheerfully kill you for putting a jinx on this voyage. But I won't. I have reasons for reaching Venus in a hurry. Put this ship down in one piece on the surface of Venus, and one third of the profit is yours—one million dollars, cold cash, in any bank you want it."

Ignatz honked softly—for him—and Jerry blinked. He swung off at a tangent. "You spoke of my luck hitting another ship across ten million miles; and now you've got reasons for reaching Hellas quickly. Anne?"

The O. M. repeated Jerry's earlier answer. "Anne. Saw it from the conning turret. The *Burgundy* broke a steering tube bank, had to make a forced landing. We got the start of an S O S, but it faded off—must have ruined the radio as they hit."

"Where?"

"Latitude 78°43′28″ south, longitude 24°18′27″ west. S O S started with something about twin mountains. Know where it is?"

"Minerva's Breasts, in the middle of Despondency. I camped near the north breast. Worst spot on Venus, that isn't too hot for life."

"Exactly. We radioed Hellas, but in that jungle it may take weeks to find them. So there's a million in it for you —*and* my place in New Hampshire where your darned luck won't bother anyone but yourself—but not Anne, definitely not!"

But Jerry was dead to the world, and Ignatz, curled up in his lap, was deciding to sleep while he could, now that everything was settled.

THEY were only eight hours out from Hellas when Ignatz stirred and looked up. The Old Man was a frenzy of action, a scowl of concentration etched on his forehead, but he was still doggedly at the controls. Again the zloaht prodded his Master awake, and Jerry sat up, some of the bleariness gone from his eyes. He reached out for a caffeine and strychnine capsule, to help him stay awake and tapped Barclay's shoulder.

"You should have dug me up hours ago, sir. I'll take over now; feel fresh as a daisy." That was a lie, and the other knew it. "You've done a beautiful job, but I know the controls better."

The O. M. mustered a smile and looked up casually enough—even patted

Ignatz—but he relinquished the job gratefully. "I couldn't have held on much longer," he agreed. "These controls are beyond me. Have to extend the navigators' knowledge in the future."

Jerry looked his thanks. "I didn't expect the relief, you know. But don't think what you said about Anne means anything to me!"

"So you did hear that? Look here, son, I don't hold anything against you personally—always liked you. But unless you give up that animal and get rid of your hoodoo—"

Jerry's backbone stiffened visibly. "Ignatz stays."

"I thought so. In that case, I don't want you around. Nothing personal, you understand, but I'm not taking chances."

"Nothing personal, of course, sir." The door closed softly as the O. M. slipped out, and Jerry chuckled. For a second there was a sparkle in his eyes before the ache of his body cut it off. "Imagine the old boy taking over that way. Some father-in-law, eh, fellow?"

They hadn't landed yet, Ignatz thought, and Anne might have something to say. There was heavy doubt in his grunt, which Jerry interpreted correctly. But the Master was busy with his own thoughts.

Now that the fingers of Venus' gravity were reaching out harder for them, the lack of full efficiency from the stabilizers made itself felt. The long, cigar-like shape put the center of gravity above the rockets and the old ship suggested that it would be so much nicer to turn over and let gravity do its work; the suggestion was mild at first, but the freighter grew more positive with each mile, shimmying sidewise toward the planet like a girl edging toward her first crush.

"Easy, old girl," Jerry pleaded. "We've got to swing you in line with Venus' rotation and let you ride down with her." He babied the ship along, coaxed her into the new path, and performed mathematical magic in his head as the plot of the new orbit came down with corrections. The navigators were taking half-hour turns now, with the captain overseeing their work. Fast talk and absolute accuracy would have to be continuous until the tugs took over.

BUT she came down smoothly, arcing in toward the south pole, held up by sheer nerve and stimulants. A thousand miles up, relative speed was nine miles a second, fall-rate three. Five hundred up, frontal speed four miles, fall-rate two. One hundred miles up from the atmosphere, frontal speed checked to coasting, fall-rate down to normal landing curve. And then they hit the mythical cushion height, where the air was thick enough to support her on her fins, and the stabilizers purred pleasantly again. From there on they would coast into Hellas and let the tugs snag her.

"Your damned luck!" The O. M. cut in crisply. "Just got a radio that the tugs are on strike at Hellas. You'll have to coast to Perdition on North Venus instead of Hellas. Can you hold her up?"

"I'll ride her. Navigator, I want coordinates for latitude 78°43′28″ south, longitude 24°18′27″ west."

"But Perdition—" The navigator was cut short by a burst of language from Barclay.

Jerry barked wearily. "Shut up! We're not going to Perdition—nor Hellas! Navigator, you heard my orders. Give me data, and see that it's right. Get scared and blunder, and you'll never know what happened."

"But the tugs are in Perdition."

"To hell with the tugs! I'll set her down on her tail." Gulps came over the phone, and Ignatz could hear the teeth of the navigator chattering. The O. M. was yelling about insanity, but he checked his raging and there was a

muttered consultation too low to hear. Then Barclay's voice cleared.

"You're all in the hands of a lunatic, but your only chance is to give him his data. We'd be dead by the time we could dig him out. Take orders from Lord!" He spoke directly into the phone. "Jerry, I'll break you like a dry stick if I live. Not one tail landing out of three works with whole controls. Listen, to reason, man! We can't help her if we're dead."

The junior navigator seized the phone, his nerves steady with desperation, his voice crisp and raw. Slowly the ship settled down, driving forward through the heavy air. Finally the navigator reported destination, and Jerry tipped the ship up cautiously. She protested at such unorthodox treatment, but reluctantly answered her controls.

"Eighteen thousand feet, directly over your destination. Weather quiet, no wind—thank God, sir! Fourteen thousand. You'll have to slow up!"

Ignatz prayed fervently to his forest and swamp gods, but they seemed far away. And the ground was rushing up while the ship swayed first to one side, then the other. Jerry was dancing a war jig in front of the balance jet bars; his eyes were glassy, his hands shook on the controls, but he fought her down, foot by foot, while the sickening speed slacked.

"Four hundred feet, level ground. Now the blast strikes, we can't see. Instrument at 300—200! Slower!"

She slowed grudgingly, but listed sidewise sharply; Jerry cut power for free fall, and she righted. Power boomed out again.

"Forty feet—God help us!"

That loss of power, short as it was, had been too much. She was all out now, but falling too fast. No, she was checking it. But another sway came. Ignatz groaned, saw that Jerry had deliberately swung her sidewise to land horizontal—at forty feet! There wasn't power enough in the laterals to hold her up. The speed picked up as she wabbled on her axis, slowed, and she righted. Jerry cut controls, grabbed a girder, and slumped. Ignatz went flaccid.

It sounded like a heavy scrunch, with attendant yells. She bounced slightly before settling. And then there was silence, and they were down. Jerry picked himself up, felt Ignatz carefully. "You're tough, fellow, not even scratched. If I hadn't been limp with exhaustion, that ten-foot free fall probably would have messed me up a little; but the others should be all right. This section took most of the shock."

Half a minute later there were groans and shouts over the ship. The Master scooped Ignatz up. "Come on, fellow, we've got to go down and stock up on provisions."

THE after hold was crowded with miscellaneous items for the comfort and safety of the spore-hunters, and he located a ready-packed kit of provisions, ample for three months' trek if the bearer could carry the load. He adjusted it carefully, felt to make sure of the feverin bottle, and took down three pairs of mud hooks, like skis crossed with canoes; the light berylium frames would support a man's weight on slimy mud or water and let him shuffle forward through the ooze of the swamps without sinking.

"Durnall's fool enough to go off in this mud," the Master told Ignatz. "That guy never did have good sense, so I've got to take three sets." He swung out to the emergency port, opened the inner seal, and pulled it shut. The outer one gave slowly, and opened—on the flat, sandy expanse of the Hellas landing field!

The old freighter had berthed neatly in the center of the rocket dock, and crowds, who'd heard or seen the landing, were streaming out. Mechanics were

working on the crew port, which seemed to be giving trouble again.

Heavy hands reached up suddenly and dragged Jerry out onto the ground. "This way, fellow." Three dock flunkies held him securely, grinning as they felt him over for a concealed weapon. Then the leader motioned the others to lead him toward a waiting spinner.

"Smart guy, eh?" He looked at Jerry appraisingly. "You gotta get up early to catch old Barclay. We got a radio you'd be coming out of the emergency, so we waited for you. Got a nice little reception hall fixed up for you."

Jerry stopped swearing long enough to ask the obvious. "Where to?" They grinned again, the three of them holding him firmly as they seated him in the spinner. At a motion from the leader, the pilot cut the motor in, and they rose and headed toward the outskirts of Hellas—but in the opposite direction from the jail.

"You'll be nice and comfortable, you and your pet," the headman volunteered. "The Old Man's putting you in one of the private suites belonging to Herndon, our branch manager. Says you're to have a nice long rest, where nobody'll bother you—or t'other way around."

No use questioning these dock flunkies, who probably knew less about it all than he did. Jerry slumped back silently, and Ignatz curled up to wait for the spinner to meet with an accident; but even misfortune refused to smile on them. They landed smoothly on the roof of one of the company's apartment buildings, and the men dragged the Master down through the roof entrance, across a hall, and into a well-fitted apartment.

"Make yourself to home," the big husky invited generously. "Herndon probably won't come here, so it's all yours. You'll find the walls and doors made of steel, the windows transplon, and locks that stay locked." He pulled the visiphone plug out and picked up the instrument. "Anything you'd like?"

The Master shrugged, estimating his chances. But they were all strong, young, and alert. He gave up any foolish ideas. "You might send up a diamond mine, or a dozen chorus girls."

"That's Herndon's specialty—chorines. See him about it." The flunkies grinned and began backing out. "The Old Man says he'll be down tomorrow, probably." The door closed and the key in the lock made a positive and unpleasant click.

Jerry turned in disgust toward the bedroom. "Sometimes, Ignatz," he muttered, "I begin to think—" He cut it as he saw the zloaht's expression. "Never mind, fellow. I'll turn the heat on low in the oven, and you can sleep there tonight. We both need shut-eye."

SUNLIGHT was streaking through the translucent transplon windows when Ignatz awoke. An investigation showed that the Master was still sleeping, and he had no desire to awaken him. Muttering in disgust at the world in general, he turned to the library in search of information on the peculiar disease with which humans seemed afflicted.

The dictionary defined love, and the encyclopedia gave an excellent medical and psychological version of it; but none of the sober, rational phrases gave any key to the idiocies Ignatz associated with that emotion. Other books bore gaudy titles that hinted at possibilities. He selected three at random, waded through pages here and there, honking and snorting loudly. They only served to confirm his preconceptions on the subject, without making things any clearer. Compared with the men in the books, Jerry was a rational being.

Still, books had their uses. Ignatz sniffed them over thoughtfully and

found the usual strong glue had been used in binding them. Since the dictionary and encyclopedia were useful, he put them back with some difficulty. Then he tipped down half a dozen other books whose titles indicated they were on the same subject and began ripping the covers off methodically. A most excellent glue, well-flavored and potent. Of course, the paper insisted on coming off with it, but that could always be spit out. What was left, he pushed into the incinerator closet.

With his stomach filled and the sleep out of his system, there was nothing left to do but explore. Sometimes these human habitations proved most interesting. He sampled a jar of vaseline, examined the working of an electric mixer with some interest, and decided to satisfy his curiosity on another matter which had bothered him for months.

Jerry Lord awoke with Ignatz's doleful bellow in his ears, mixed with sundry threshings and bumpings, and the jangling of an uncertain bell. He rubbed the sleep out of his eyes with hands that were sure and steady again, looked down, and grinned. "I told you to let those spring alarm clocks alone, fellow. Suppose they do go *tick-tick* instead of purring like the electrics—do you have to see why?"

Ignatz had found out why—with details. Jerry untangled the zloaht's tail from the main spring and various brass wheels, and unwrapped the alarm spring from his inky body. Once that was done, they both prowled around until satisfied that escape from the apartment was completely impossible.

Jerry tried the stereovisor while eating breakfast, but there was no news; only the usual morning serials and music came over. He dug out a book on rocket motors to kill time, while Ignatz succeeded in turning on the hot water in the bathroom and crawling into the tub. If the O. M. ran true to form, he'd show up when it suited his own convenience.

It was noon when Barclay unlocked the door and came in, leaving a couple of guards outside. "Crazy young fool!"

Jerry grinned ruefully. "A nice trick, your fake data; I actually thought I was landing at Minerva's Breasts. Well, I didn't ruin your darned freighter."

"Didn't even wreck the radio. Sweetest tail landing I ever saw, and I made a couple myself." He chuckled as the Master stared. "Sure, I used to pilot them, back when it took men. But I never tried a horizontal, though I've heard of it."

He fished out an envelope. "Here, I keep my word. Deposit book, Prospectors' Commercial, one million dollars. And the deed to the house in New Hampshire, if you ever get back there—which you won't on any of my ships. You can save your thanks."

Jerry took it calmly. "I didn't intend to thank you; I earned it." He stuffed the envelope in the prospector's kit he'd brought with him. "What word from Anne? And when do I get out of here?"

"I've made arrangements to have you leave today." Seeing Jerry's look, he shook his head. "Not to jail, exactly—just to the new detention house they've erected since you were here last; they use it for drunks and weed-chewers. I've booked you as a stowaway to be held for convenient deportation, and I'll make the charge stick. Judging from last night, I don't want you in any of my employees' quarters; they get hit by sudden bad luck."

"Well?"

"Herndon got married and left me in the lurch last night—when I most need him."

"That looks like your bad luck, not his," Jerry pointed out. "Though I suppose you fired him."

"He quit—to lead the glamorous life." The O. M. smiled wryly. "His bad luck was that he married that

Despondency Swamp was no place for a sick man—but it was also no place to hurry. They stuck with the raft.

woman who dances at the casino with a Martian sand-eel."

Jerry nodded; he'd seen her act, and there was no answer. Instead, he steered the conversation back to Anne. "You know I could locate the *Burgundy* in a couple of hours if you'd let me out of here. I didn't spend two months in Despondency for nothing. And Ignatz is supposed to bring good luck out there."

Barclay shrugged. "Good luck for you; that's what I'm afraid of. It so happens we've located the *Burgundy* already, without your help. Now we've been sending out searching parties on mud hooks for Anne and Pete; the captain had to take orders from her and let them go." His face was momentarily bitter. "I thought Durnall had better sense than to go lugging her around the swamps where even the compass is cockeyed."

"I was afraid of that. You made a mistake, sir, in making me land at Hellas instead of the Breasts."

Barclay grunted, and let it pass. They all knew there was about as much chance of one man finding her in the steaming swamp jungle as the proverbial needle. "If I thought you could find her, I'd probably be fool enough to let you go. Better pack up your luggage. These men will take you over to detention house."

THE detention ward was comfortable enough, and Barclay had arranged for all the Master's ordinary wants. But it was no nearer Anne. He paced the room endlessly until Slim, the flunky, brought his supper. Bribery had failed before, but he tried it again.

The guard grinned. "Here's your supper, such as it is. We found the foods mostly turned sour since you moved in this noon. And your check's no good; Prospectors' Commercial closed its doors until a new shipment of gold can come through from Earth."

Ignatz grunted, but the Master refused to give up. "But the check will be good when it opens."

Slim hunched his shoulders. "Not with your money in it; it won't open."

"You don't believe that superstition, do you?" Jerry's voice was not particularly convincing.

"Huh? Look, mister, since you come here, I got word my wife just had triplets—and me a poor man! I don't want nothing to do with you or yourn." He shoved the food in and swung on his heel.

Jerry swore, then called after the jailer. "Hey, wait! Can you get a message to Manager Barclay? Tell him I know how he can find his daughter. Tell him I want to see him tomorrow morning!"

Slim nodded glumly and went on. Jerry turned back to his meal, refusing to answer Ignatz's inquiring grunts. The zloaht watched his Master finish and begin the endless pacing again, smoking incessantly on the pungent Venusian cigarettes. He picked up a butt and honked curiously.

"Nerves, fellow," Jerry answered. "They're supposed to calm you when something bothers you—like my pipe that I left back on Earth. Want to try one?" He placed one between Ignatz's sharp lips, and lit it. "Now, you puff in, take the smoke into your lungs, then blow it out. Sure, like that."

Ignatz coughed the smoke out and bellowed hoarsely, swearing heatedly at the Master. An odd sensation stirred in him somewhere, however, and he regarded the cigarette thoughtfully; sometimes a thing was better after a time or two. Dubiously, he picked it up with his antennae and tried again, with slightly better success. It didn't taste so nauseous that time. And the third try was still better.

"Better go easy on it, fellow," Jerry advised. "I don't know how it'll affect your metabolism; alcohol had no results

with you, but this might."

Ignatz heard vaguely, but didn't trouble his head about it. There was a nice warm feeling stealing along his nerves and down toward his tail. He'd been a fool to think life was hard—it was ducky, that's what. And this room was beautiful, when it stood still. Just now, it was running around in circles; he pursued the walls in their crazy rotation, but gave up—they were too fast for him.

Jerry giggled for no reason Ignatz could see. "Ignatz, you're acting drunk. And that butt's going to burn you if you don't spit it out."

"Hwoonk!" said Ignatz. Still, it was a little warm; laboriously he removed the burning thing and tossed it away. *"Hwulp!"* Now why did his tail insist on jerking him up like that? *"Hwulp!"* If it insisted, he'd be the last one to stop it. He gazed up at the Moon that had mysteriously sailed away from Earth and was gliding across the ceiling of the room. Such a lovely night. Must make a song about the lovely night. Lovely song.

His fog-horn voice creaked out in a quavering bellow, rose to a crescendo wail, and popped out with the sound of a starting rocket. Lovely song—lovely! Jerry stuffed him in a pillow, and tried to silence him, but without immediate success. If the men in detention wanted to sleep, what of it? Anyway, they were making too much noise themselves.

Who wanted to sleep? Too nice a night to sleep. He executed a remarkable imitation of a steam buzz saw. Jerry gave up and crawled in beside him, growling unhappily. Ignatz honked reproachfully at the Master, rolled over and snored loudly.

THE NEXT morning he awoke to see the guard let the O. M. in, and tried to climb down from the bunk. Something lanced through his head, and he fell back with a mournful bellow. He hadn't felt that way last night.

Jerry grinned at him. "Hangover—what'd you expect?" He turned back to Barclay. "The flunky delivered my message, then?"

"He did." The O. M. hadn't been doing much sleeping, from the look on his face. "If your plan involves letting you out, don't bother telling me."

"It doesn't. I've found from experience there's no use trying to change your mind." He jerked back the package of cigarettes as Ignatz dived for it. "But the semiannual mud run is due any day now, and Despondency is hell then. You've got to get her out."

The O. M. nodded, he'd been thinking the same. Jerry went on. "All right. A man can't locate anything smaller than a rocketship up there. But a zloaht can. Well, thirty miles north of Minerva's Breasts—the compass points south by southeast, in that neighborhood—there's a village of Ignatz's people built out in a little lake. They've dammed up Forlorn River there, and built their houses on rafts, working with their antennae and practically no raw materials. They grow food, along the shores, and they've got a mill of sorts to grind it with. Of course they're not human, but they'll be up alongside us yet, if we don't kill them off first. Highly civilized now."

The O. M. snorted, glanced at Ignatz hunting for butts. "Civilized! Sounds more like beavers to me."

"O. K., have it your way." Jerry was used to man's eternal sense of divine descent—or maybe the word was ascent. "Anyway, they've developed an alphabet of sorts and have tame animals. What's more important, I taught them some English, and they'll do almost anything for chocolate and peanuts."

Barclay caught the idea. "You mean, I'm to send up there, get in touch with them, and have them look for Anne? Sounds pretty far-fetched, but I'm willing to try anything once."

Jerry began sketching a crude map.

"They can't talk to you, but when one of them comes for the chocolates, you'll know he's found her—they're honest about bargains. Then all you have to do is follow."

The O. M. took the note and started toward the door. "I'll let you know how it works," he promised. "If they find her, I'll even risk shipping you back to Earth." Jerry grunted and turned back to Ignatz, who was rumbling unhappily on the cot, his foot-and-a-quarter body a bundle of raw nerves.

It was three slow, dull days later when Slim brought another note in. "Mr. Barclay sent this down to you," he said briefly. Slim had as little to do with the Master as possible.

Jerry opened it eagerly, to find the wording terse and to the point:

> Three spinners, trying to make your lake, broke down. Rescue crews out for them now. I'll have nothing more to do with any of your fool plans.

He passed it to Ignatz who read it glumly, then watched hopefully as Jerry took out a cigarette. Seeing the pack returned to its place beyond his reach, he snorted his disgust and retired to the corner in sulky silence.

The silence was broken by a reverberating boom that rocked the detention house like a straw in the wind. The floor twisted crazily and the transplon window fell out with a brittle snap. Then the noise quieted and Jerry picked himself up from the floor, grabbed Ignatz and the prospector pack. He wasted no words, but dived toward the open window.

Slim came racing down the corridor. "Air conditioner motor exploded right below," he yelled. "You all right, Lord?" As he saw the two climbing out the window, he grabbed for his needle gun, then rammed it back. "I ain't taking chances with this thing; it'd explode in my hands with you around. The farther you two get, the happier I'll be!"

SOMETIMES a bad reputation had its uses. Jerry dropped ten feet to the ground, spotted a spinner standing empty and unlocked to the rear of the building, and set out for it. He dived through the door, yanked it shut, and cut in the motor as the guards began streaming out. Ignatz looked at the fuel gauge and was surprised to see it full.

Before the gun on the roof could be lined up, the spinner was rising smoothly and speeding away. Jerry swung in a half circle and headed north, with the rheostat clear over, and the little ship out through the air with a whistling rush. Hellas dropped behind, five miles, ten, then fifteen. Ten miles ahead lay the muck of Hellonfire, beyond that Despondency.

"Only let me reach the swamps, fellow," Jerry begged. "Don't get us in any funny business now." Ignatz had his antennae curled up in a tight knot, trying by mental concentration to oblige.

Two miles short of the swamps, the engine began to stutter, starting and stopping erratically. Jerry fussed with the controls, but the ship slowed, moving along at an uncertain speed. The first line of the Hellonfire verdure rose through the thin mists as the motor stopped. Jerry's teeth were clenched as he tried to hold the spinner in a flat curve that would carry them clear. But the ground came up steadily as the ship crawled toward the swamp.

By a hair-thick margin they cleared the tangled swamp growth, and were over Hellonfire. And the little motor caught, purred softly, and drove the vanes steadily against the air, lifting them up easily. Ignatz relaxed and Jerry reached over to pat him softly. Now, according to the legend, luck should be good.

It was. They glided along across Hellonfire smoothly, passed over the

wreck of the first spinner sent out by the O. M. and headed on. The compass began to waver and twist without good reason, and Jerry was forced to rely on Ignatz's sense of direction. The zloaht held his antennae out as a pointer toward his home village, and the Master followed his direction confidently.

Hellonfire drifted by under them, and gave place to the heavy tangle of Despondency. Looking down they could see the slow crawl of the mud-run that made the swamp even more impassable twice a year, and Jerry shook his head. If Anne were out in that, unless she stayed on a high hummock, there was little hope of finding her. They swept between the Breasts and saw the temporary camp, established as a base for searchers, being dismantled; the men would leave before the mud crept higher.

And then Ignatz hooted, and Jerry looked down to see the little lake glistening below him. Floating rafts covered it, neatly laid out in rows, and thatched over with fine craftsmanship. Zloahts like Ignatz were busily engaged in the huts and canals between them. On the shores of the lake, others were driving their tame zihis, twenty times as large as they were, about in the fields. Now and again, a foghorn yelp across the lake was answered from the largest raft.

Jerry let down the pontoons and dropped the spinner lightly on the lake. Ignatz ducked out and across the water to the chief's building, dragging a waterproof package of chocolate with him. He was back inside of ten minutes, hooting shrilly, a small bundle in his mouth.

The Master took it. On the coarse papyrus he made out a roughly executed picture of a man and woman, pulled on a narrow raft by two of the zihis. Under it, there were two black squares with one white sandwiched between them, and inside the drawing was a bar of chocolate of a different brand from that which Jerry had sent them.

The Master snapped the rheostat over. "So she left a day and two nights ago, with Durnall. Traded her chocolate for zihis and raft. Know what direction she went?"

Ignatz hooted and pointed south and east, along a sluggish stream that fed into Forlorn River. Jerry turned the spinner and headed that way, searching for signs of them. Zihi travel should average twenty or more miles a day, which would place them some seventy miles out. He slowed up after fifty, noting that the stream was narrowing. If it ended before he reached Anne, it meant hours of scouting, probably hopelessly, in search of her. There were a hundred different courses she could take once she left the Little Hades.

BUT HE sighted her before the stream ended in its twisted little feeders. She had stopped, probably picking her course, and he could see her look up at the sound of his motor and begin signaling frantically. He set the spinner down sharply, jerking it to a short stop within a few feet of the raft and opened the door as she headed the zihis toward him. Durnall was lying on the raft, covered by a poncho.

"Jerry Lord!" Her voice was shrill, tired, her eyes red and sleepless. "Thank Heaven! Pete's got the fever—red fever—and we had no feverin in our packs." She grabbed the bottle he handed, poured three tablets down Durnall's throat. "Help me load him in and the duffel—and take us to the hospital, pronto!"

Jerry grabbed Durnall and loaded him in the back as quickly as he could. Ignatz was giving orders to the zihis to return to the village with the raft, while Anne gathered the duffel and climbed back. She sank down beside the sick man, whose face had the dull brick-red of an advanced case of swamp fever.

"Your father's been worried sick—so have I."

"Have you?" Her voice was flat. "Jerry, how soon can we reach the hospital?"

He shrugged. "Three hours, I guess." Ignatz glanced up at the Master's face and grunted as softly as he could. Of course, Anne had been gone for days, alone with Durnall, and sick men had a way of working on a woman's sympathies. He brushed his antennae lightly against the Master's ankles.

"How'd you find the village?" Jerry asked. "I've been trying to get a chance to help you, but, I was afraid you'd be lost in the mud-run."

She looked up, but went on fussing over Durnall. "When we couldn't find the *Burgundy,* I remembered your story about getting lost yourself, and how you found the village. We headed the way you said the compass pointed, and holed up there, till I found they understood me. Then I bartered some supplies for their raft and animals. With what you'd told me helping us, we'd have made out all right if Pete hadn't come down with fever; I was lucky, myself, and didn't catch it."

Durnall was groaning and tossing uneasily, and she turned her attention back to him. Jerry bent over his controls, and drove silently south toward Hellas, watching Despondency change to Hellonfire. Then they were out of the swamps, and he turned back to assure Anne they were almost there.

But his head jerked back sharply. The rotor, which had been circling sweetly overhead, now twanged harshly and dragged back on the motor. Ignatz ducked back to avoid the Master's look, and groaned. One of the rotor vanes had cracked off, and the others were unbalanced and moving sluggishly. The ship was coming down much too fast. Jerry cut the motor off, tried to flatten the fall, and failed. He yanked the shock-cushion lever out, and a rubber mattress zipped out behind him, designed to save the passengers from a nose collision in the fog. Before he could reach the pilot's cushion lever, the ship's nose hit the ground and buckled in.

Ignatz saw the Master slump forward over the controls, and then something tore sharply at the zloaht's snout horn, and little lights streaked out. Blackness shot over him hotly.

HE swam up through a gray haze, tried to snort, and failed. When he opened his eyes, he saw yards of gauze covering his snout, and Jerry was propped up in bed watching him.

"Major operation, fellow. The doc says he had to cut out half your horn because of something that splintered it. You had me beat by half a day, and the doc says I was out for forty-eight hours." He wiggled in the bed. "I'm still solid enough, though, except for a couple of bones, and a bump on the head."

Ignatz looked around slowly, conscious from his sluggish reactions that they must have given him drugs. He was in a small room, and his bed was a miniature replica of Jerry's. But it wasn't a hospital.

Jerry grinned. "They were afraid you'd be a jinx in the city, and I kept yelling for you, so they put us both up here in a house the O. M. owns just inside Hellonfire. I've been waiting for them to bring you to before we entertained visitors." He raised his voice. "Hey, nurse, tell them all clear here."

With his words, the door burst open, and the Old Man hurried in. "Well, it's about time. Look fit as ever."

"Yeah, fit to go back to your lousy detention house."

The O. M. was pleased with himself. "Not this time. I figured out something else. Got the deed to the New Hampshire house still? Good. Well, I'm taking it back, and putting this deed to the swamp house in its place. That pet of yours should be harmless

here. And I'm advising you to invest your money in our stock."

"So you won't ship me back to Earth, eh? Afraid I'd get your ship smashed?"

Barclay shook his head. "I'm not worried about the ship. What I'm worried about is a branch manager, and you're it—if you want the job."

Jerry took it calmly. "What's the catch?"

"None. Bad luck or not, you get things done, and you know rockets. That's what I need, you impudent puppy. Just keep your pet out here and things should go swimmingly." He got up brusquely. "You've got another visitor."

"Don't forget what I said about—" Jerry started to shout, and then she was framed in the door.

"Hi, Jerry. You both four'oh again?"

Ignatz grunted, while Jerry stared. "Durnall?"

"He's doing all right." Anne took a seat beside him, held out her hands. "Now that he's safe, let's forget him. Pete isn't a bad guy, but I don't like darn fools who get me into messes like the last one, even when it's half my fault."

Jerry digested it slowly, and Ignatz cursed his bandages. Now was the time for him to slip back into the swamps, where Jerry could never make the mistake of taking him out again. He could see where the Master was going to need decent breaks with all the responsibility coming up. But the bandages held him securely.

Anne hauled the little bed closer, ran warm fingers over Ignatz's back. "You'll have to live out here and commute by spinner, of course, but I'll take care of Ignatz while you're gone. He owes us a lot of good fortune, and we're going to collect it."

"I—" Jerry glanced at Ignatz. "You know how your father feels about him."

She smiled impishly. "Dad figured it all out. You see I brought something back with me in my duffel, and when he found I meant to keep it, he gave up." She reached into a little bag and hauled out the snooty head of another zloaht. "Meet Ichabod."

Jerry gulped. "Well, I'll be—" And suddenly he had a great deal of urgent business.

Ignatz longed for a cigarette, but he snorted softly and turned away.

In the September Astounding—An article on the personal difficulties of being an astronomer: "The Other Side of Astronomy," by R. S. Richardson, of Mt. Wilson Observatory.

IN TIMES TO COME

October Astounding brings Dr. E. E. Smith's new novel, "Gray Lensman." It's extremely difficult to say much concerning the story that will explain the importance and quality of it to any of you who have not read Dr. Smith's work before. To you others who have—it's Smith, and he's done a better, stronger job on this than he did, even, on "Galactic Patrol."

Naturally, it's going to be advertised extensively. The chances are pretty fair that a lot of newsstands are going to be sold out early on that October issue. Which is fair warning.

Next month, Astounding has an unusual collection of material, too. Frederick Engelhardt's serial, "General Swamp, C. I. C." closes, and violates science-fiction tradition in closing in a logical, militarily sane action. Manly Wade Wellman is back in the next issue, too, with an unusual type of story—"Forces Must Balance" —proving that the law of action and reaction applies not only to rocketships and science, but to political science as well. If four settled, civilized planets are looking for room, and one new planet wanders into the System from outer space—who gets it?

And Don Evans—a new author to Astounding, but a man who had an excellent little short in *Unknown*—has a long novelette, "The Last Hope," coming up next month. It's not the first time the plot's been used—but he's put something new in the matter of power in the telling. It's one of the kind that moves so swiftly the twenty-thousand-word length seems more like five thousand. Evans is, I think, another one of those new, top-grade writers you'll be seeing fairly regularly in the future.

THE EDITOR.

THE ANALYTICAL LABORATORY

With his usual success, de Camp has distorted the readings on the Laboratory again. His article "Design for Life," again ranked far higher in the scale than articles have a habit of doing. Incidentally, de Camp has another article coming up that isn't near enough for the column above, but worth mentioning. "There Ain't No Such—" is an article about screwy animals to end all screwy animals. If you think science-fiction authors have imagination unsurpassed, you should investigate some of the honeys Nature's not only thought up, but actually produced in working models. And as for specialists—there's the one that lives only in the felt mats Germans set beer mugs on; nowhere else!

Also coming is "The Other Side of Astronomy" by one who's lived it—R. S. Richardson of the Mount Wilson Observatory. It isn't science, perhaps, but it's certainly worth reading!

The battle for first place this month seems to have been largely conducted as a three-cornered fight between "The Morons," "The Hermit of Mars," and the article "Design for Life." The fight came out:

1.	The Morons	Harl Vincent
2.	The Hermit of Mars	Clifford D. Simak
3.	Design for Life (article)	L. Sprague de Camp
4.	One Against the Legion	Jack Williamson
5.	When the Future Dies	Nat Schachner

THE EDITOR.

HEAVY PLANET

By LEE GREGOR

HEAVY PLANET

A new author presents a story of a ship that drifted down from space to a strange, dense world—

By Lee Gregor

Illustrated by Koll

ENNIS was completing his patrol of Sector EM, Division 426 of the Eastern Ocean. The weather had been unusually fine, the liquid-thick air roaring along in a continuous blast that propelled his craft with a rush as if it were flying, and lifting short, choppy waves that rose and fell with a startling suddenness. A short savage squall whirled about, pounding down on the ocean like a million hammers, flinging the little boat ahead madly.

Ennis tore at the controls, granite-hard muscles standing out in bas-relief over his short, immensely thick body, skin gleaming scalelike in the slashing spray. The heat from the sun that hung like a huge red lantern on the horizon was a tangible intensity, making an inferno of the gale.

The little craft, that Ennis maneuvered by sheer brawn, took a leap into the air and seemed to float for many seconds before burying its keel again in the sea. It often floated for long distances, the air was so dense. The boundary between air and water was sometimes scarcely defined at all—one merged into the other imperceptibly. The pressure did strange things.

Like a dust mote sparkling in a beam, a tiny speck of light above caught Ennis' eye. A glider, he thought, but he was puzzled. Why so far out here on the ocean? They were nasty things to handle in the violent wind.

The dust mote caught the light again. It was lower, tumbling down with a precipitancy that meant trouble. An upward blast caught it, checked its fall. Then it floated down gently for a space until struck by another howling wind that seemed to distort its very outlines.

Ennis turned the prow of his boat to meet the path of the falling vessel. Curious, he thought; where were its wings? Were they retracted, or broken off? It ballooned closer, and it wasn't a glider. Far larger than any glider ever made, it was of a ridiculous shape that would not stand up for an instant. And with the sharp splash the body made as it struck the water—a splash that fell in almost the same instant it rose—a thought seemed to leap up in his mind. A thought that was more important than anything else on that planet; or was to him, at least. For if it was what he thought it was—and it had to be that—it was what Shadden had been desperately seeking for many years. What a stroke of inconceivable luck, falling from the sky before his very eyes.

The silvery shape rode the ragged waters lightly. Ennis' craft came up with a rush; he skillfully checked its speed and the two came together with a slight jar. The metal of the strange vessel dented as if it were made of rubber. Ennis stared. He put out an arm and felt the curved surface of the strange ship. His finger prodded right through

the metal. What manner of people were they who made vessels of such weak materials?

He moored his little boat to the side of the larger one and climbed to an opening. The wall sagged under him. He knew he must be careful; it was frightfully weak. It would not hold together very long; he must work fast if it were to be saved. The atmospheric pressure would have flattened it out long ago, had it not been for the jagged rent above which had allowed the pressure to be equalized.

He reached the opening and lowered himself carefully into the interior of the vessel. The rent was too small; he enlarged it by taking the two edges in his hands and pulling them apart. As he went down he looked askance at the insignificant plates and beams that were like tissue paper on his world. Inside was wreckage. Nothing was left in its original shape. Crushed, mutilated machinery, shattered vacuum tubes, sagging members, all ruined by the gravity and the pressure.

There was a pulpy mess on the floor that he did not examine closely. It was like red jelly, thin and stalky, pulped under a gravity a hundred times stronger and an atmosphere ten thousand times heavier than that it had been made for.

He was in a room with many knobs and dials on the walls, apparently a control room. A table in the center with a chart on it, the chart of a solar system. It had nine planets; his had but five.

Then he knew he was right. If they came from another system, what he wanted must be there. It could be nothing else.

He found a staircase, descended. Large machinery bulked there. There was no light, but he did not notice that. He could see well enough by infrared, and the amount of energy necessary to sustain his compact gianthood kept him constantly radiating.

Then he went through a door that was of a comfortable massiveness, even for his planet—and there it was. He recognized it at once. It was big, squat, strong. The metal was soft, but it was thick enough even to stand solidly under the enormous pull of this world. He had never seen anything quite like it. It was full of coils, magnets, and devices of shapes unknown to him. But Shadden would know. Shadden, and who knows how many other scientists before him, had tried to make something which would do what this could do, but they had all failed. And without the things this machine could perform, the race of men on Heavyplanet was doomed to stay down on the surface of the planet, chained there immovably by the crushing gravity.

IT WAS atomic energy. That he had known as soon as he knew that the body was not a glider. For nothing else but atomic energy and the fierce winds was capable of lifting a body from the surface of Heavyplanet. Chemicals were impotent. There is no such thing as an explosion where the atmosphere pressed inward with more force than an explosion could press outward. Only atomic, of all the theoretically possible sources of energy, could supply the work necessary to lift a vessel away from the planet. Every other source of energy was simply too weak.

Yes, Shadden, all the scientists must see this. And quickly, because the forces of sea and storm would quickly tear the ship to shreds, and, even more vital, because the scientists of Bantin and Marak might obtain the secret if there was delay. And that would mean ruin—the loss of its age-old supremacy—for his nation. Bantin and Marak were war nations; did they obtain the secret they would use it against all the other worlds that abounded in the Universe.

The Universe was big. That was why Ennis was so sure there was atomic energy on this ship. For, even though

it might have originated on a planet that was so tiny that *chemical energy*—although that was hard to visualize—would be sufficient to lift it out of the pull of gravity, to travel the distance that stretched between the stars only one thing would suffice.

He went back through the ship, trying to see what had happened.

There were pulps lying behind long tubes that pointed out through clever ports in the outer wall. He recognized them as weapons, worth looking into.

There must have been a battle. He visualized the scene. The forces that came from atomic energy must have warped even space in the vicinity. The ship pierced, the occupants killed, the controls wrecked, the vessel darting off at titanic speed, blindly into nothing. Finally it had come near enough to Heavy-planet to be enmeshed in its huge web of gravity.

Weeaao-o-ow! It was the wailing roar of his alarm siren, which brought him spinning around and dashing for his boat. Beyond, among the waves that leaped and fell so suddenly, he saw a long, low craft making way toward the derelict spaceship. He glimpsed a flash of color on the rounded, gray superstructure, and knew it for a battleship of Marak. Luck was going strong both ways; first good, now bad. He could easily have eluded the battleship in his own small craft, but he couldn't leave the derelict. Once lost to the enemy he could never regain it, and it was too valuable to lose.

The wind howled and buffeted about his head, and he strained his muscles to keep from being blasted away as he crouched there, half on his own boat and half on the derelict. The sun had set and the evening winds were beginning to blow. The hulk scudded before them, its prow denting from the resistance of the water it pushed aside.

He thought furiously fast. With a quick motion he flipped the switch of the radiophone and called Shadden. He waited with fierce impatience until the voice of Shadden was in his ear. At last he heard it, then: "Shadden! This is Ennis. Get your glider, Shadden, fly to a45j on my route! Quickly! It's come, Shadden! But I have no time. Come!"

He flipped the switch off, and pounded the valve out of the bottom of his craft, clutching at the side of the derelict. With a rush the ocean came up and flooded his little boat and in an instant it was gone, on its way down to the bottom. That would save him from being detected for a short time.

BACK into the darkness of the spaceship. He didn't think he had been noticed climbing through the opening. Where could he hide? Should he hide? He couldn't defeat the entire battleship singlehanded, without weapons. There were no weapons that could be carried anyway. A beam of concentrated actinic light that ate away the eyes and the nervous system had to be powered by the entire output of a battleship's generators. Weapons for striking and cutting had never been developed on a world where flesh was tougher than metal. Ennis was skilled in personal combat, but how could he overcome all that would enter the derelict?

Down again, into the dark chamber where the huge atomic generator towered over his head. This time he looked for something he had missed before. He crawled around it, peering into its recesses. And then, some feet above, he saw the opening, and pulled himself up to it, carefully, not to destroy the precious thing with his mass. The opening was shielded with a heavy, darkly transparent substance through which seeped a dim glow from within. He was satisfied then. Somehow, matter was still being disintegrated in there, and energy could be drawn off if he knew how.

There were leads—wires of all sizes, and busbars, and thick, heavy tubes that

bent under their own weight. Some must lead in and some must lead out; it was not good to tamper with them. He chose another track. Upstairs again, and to the places where he had seen the weapons.

They were all mounted on heavy, rigid swivels. He carefully detached the tubes from the bases. The first time he tried it he was not quite careful enough, and part of the projector itself was ripped away, but next time he knew what he was doing and it came away nicely. It was a large thing, nearly as thick as his arm and twice as long. Heavy leads trailed from its lower end and a lever projected from behind. He hoped it was in working condition. He dared not try it; all he could do was to trace the leads back and make sure they were intact.

He ran out of time. There came a thud from the side, and then smaller thuds, as the boarding part incautiously leaped over. Once there was a heavy sound, as someone went all the way through the side of the ship.

"Idiots!" Ennis muttered, and moved forward with his weapon toward the stairway. Noises came from overhead, and then a loud crash buckled the plates of the ceiling. Ennis leaped out of the way, but the entire section came down, with two men on it. The floor sagged, but held for the moment. Ennis, caught beneath the downcoming mass, beat his way free. He came up with a girder in his hand, which he bent over the head of one of the Maraks. The man shook himself and struck out for Ennis, who took the blow rolling and countered with a buffet that left a black splotch on a skin that was like armor plate and sent the man through the opposite wall. The other was upon Ennis, who whirled with the quickness of one who maneuvers habitually under a pressure of ten thousand atmospheres, and shook the Marak from him, leaving him unconscious with a twist in a sensitive spot.

The first opponent returned, and the two grappled, searching for nerve centers to beat upon. Ennis twisted frantically, conscious of the real danger that the frail vessel might break to pieces beneath his feet. The railing of a staircase gave behind the two, and they hurtled down it, crashing through the steps to the floor below. Their weight and momentum carried them through. Ennis released his grip on the Marak, stopped his fall by grasping one of the girders that was part of the ship's framework. The other continued his devastating way down, demolishing the inner shell, and then the outer shell gave way with a grinding crash that ominously became a burbling rush of liquid.

ENNIS looked down into the space where the Marak had fallen, hissed with a sudden intake of breath, then dove down himself. He met rising water, gushing in through a rent in the keel. He braced himself against a girder which sagged under his hand and moved onward against the rushing water. It geysered through the whole in a heavy stream that pushed him back and started to fill the bottom level of the ship. Against that terrific pressure he strained forward slowly, beating against the resisting waves, and then, with a mighty flounder, was at the opening. Its edges had been folded back upon themselves by the inrushing water, and they gaped inward like a jagged maw. He grasped them in a huge hand and exerted force. They strained for a moment and began to straighten. Irresistibly he pushed and stretched them into their former position, and then took the broken ends in his hands and *squeezed*. The metal grew soft under his grip and began to flow. The edges of the plate welded under that mighty pressure. He moved down the crack and soon it was watertight. He flexed his hands as he rose. They ached; even his strength was beginning to be taxed.

Noises from above; pounding feet. Men were coming down to investigate

the commotion. He stood for a moment in thought, then turned to a blank wall, battered his way through it, and shoved the plates and girders back into position. Down to the other end of the craft, and up a staircase there. The corridor above was deserted, and he stole along it, hunting for the place he had left the weapon he had prepared. There was a commotion ahead as the Maraks found the unconscious man.

Two men came pounding up the passageway, giving him barely enough time to slip into a doorway to the side. The room he found himself in was a sleeping chamber. There were two red pulps there, and nothing that could help him, so he stayed in there only long enough to make sure that he would not be seen emerging into the hall. He crept down it again, with as little noise as possible. The racket ahead helped him: it sounded as though they were tearing the ship apart. Again he cursed their idiocy. Couldn't they see how valuable this was?

They were in the control room, ripping apart the machinery with the curiosity of children, wondering at the strange weakness of the paperlike metal, not realizing that, on the world where it was fabricated, it was sufficiently strong for any strain the builders could put upon it.

The strange weapon Ennis had prepared was on the floor of the passage, and just outside the control room. He looked anxiously at the trailing cables. Had they been stepped on and broken? Was the instrument in working condition? He had to get it and be away; no time to experiment to see if it would work.

A noise from behind, and Ennis again slunk into a doorway as a large Marak with a colored belt around his waist strode jarringly through the corridor into the control room. Sharp orders were barked, and the men ceased their havoc with the machinery of the room. All but a few left and scattered through the ship. Ennis' face twisted into a scowl. This made things more difficult. He couldn't overcome them all single-handed, and he couldn't use the weapon inside the ship if it was what he thought it was from the size of the cables.

A Marak was standing immediately outside the room in which Ennis lurked. No exit that way. He looked around the room; there were no other doors. A porthole in the outer wall was a tiny disk of transparency. He looked at it, felt it with his hands, and suddenly pushed his hands right through it. As quietly as he could, he worked at the edges of the circle until the hole was large enough for him to squeeze through. The jagged edges did not bother him. They felt soft, like a ragged pat of butter.

The Marak vessel was moored to the other side of the spaceship. On this side the wind howled blankly, and the sawtooth waves stretched on and on to a horizon that was many miles distant. He cautiously made his way around the glistening rotundity of the derelict, past the prow, straining silently against the vicious backward sweep of the water that tore at every inch of his body. The darker hump of the battleship loomed up as he rounded the curve, and he swam across the tiny space to grasp a row of projections that curved up over the surface of the craft. He climbed up them, muscles that were hard as carborundum straining to hold against all the forces of gravity and wind that fought him down. Near the top of the curve was a rounded, streamlined projection. He felt around its base and found a lever there, which he moved. The metal hump slid back, revealing a rugged swivel mounting with a stubby cylindrical projector atop it.

HE SWUNG the mounting around and let loose a short, sudden blast of white fire along the naked deck of the battleship. Deep voices yelled within

and men sprang out, to fall back with abrupt screams clogged in their throats as Ennis caught them in the intolerable blast from the projector. Men, shielded by five thousand miles of atmosphere from actinic light, used to receiving only red and infrared, were painfully vulnerable to this frightful concentration of ultraviolet.

Noise and shouts burst from the derelict spaceship alongside, sweeping away eerily in the thundering wind that seemed to pound down upon them with new vigor in that moment. Heads appeared from the openings in the craft.

Ennis suddenly stood up to his full height, bracing himself against the wind, so dense it made him buoyant. With a deep bellow he bridged the space to the derelict. Then, as a squad of Maraks made their difficult, slippery way across the flank of the battleship toward him, and as the band that had boarded the spaceship crowded out on its battered deck to see what the noise was about, he dropped down into a crouch behind his ultraviolet projector, and whirled it around, pulling the firing lever.

That was what he wanted. Make a lot of noise and disturbance, get them all on deck, and then blow them to pieces. The ravening blast spat from the nozzle of the weapon, and the men on the battleship dropped flat on the deck. He found he could not depress the projector enough to reach them. He spun it to point at the spaceship. The incandescence reached out, and then seemed to waver and die. The curent was shut off at the switchboard.

Ennis rose from behind the projector, and then hurtled from the flank of the battleship as he was struck by two Maraks leaping on him from behind the hump of the vessel. The three struck the water and sank, Ennis struggling violently. He was on the last lap, and he gave all his strength to the spurt. The water swirled around them in little choppy waves that fell more quickly than the eye could follow. Heavier blows than those from an Earthly trip hammer were scoring Ennis' face and head. He was in a bad position to strike back, and suddenly he became limp and sank below the surface. The pressure of the water around him was enormous, and it increased very rapidly as he went lower and lower. He saw the shadowy bulk of the spaceship above him. His lungs were fighting for air, but he shook off his pretended stupor and swam doggedly through the water beneath the derelict. He went on and on. It seemed as though the distance were endless, following the metal curve. It was so big from beneath, and trying to swim the width without air made it bigger.

Clear, finally, his lungs drew in the saving breaths. No time to rest, though. He must make use of his advantage while it was his; it wouldn't last long. He swam along the side of the ship looking for an opening. There was none within reach from the water, so he made one, digging his stubby fingers into the metal, climbing up until it was safe to tear a rent in the thick outer and inner walls of the ship.

He found himself in one of the machine rooms of the second level. He went out into the corridor and up the stairway which was half-wrecked, and found himself in the main passage near the control room. He darted down it, into the room. There was nobody there, although the noises from above indicated that the Maraks were again descending. There was his weapon on the floor, where he had left it. He was glad that they had not gotten around to pulling that instrument apart. There would be one thing saved for intelligent examination.

The clatter from the descending crowd turned into a clamor of anger as they discovered him in the passageway. They stopped there for a moment, puzzled. He had been in the ocean, and had somehow magically reappeared within the derelict.

It gave him time to pick up the weapon.

Ennis debated rapidly and decided to risk the unknown. How powerful the weapon was he did not know, but with atomic energy it would be powerful. He disliked using it inside the spaceship; he wanted to have enough left to float on the water until Shadden arived; but they were beginning to advance on him, and he had to start something.

He pulled a lever. The cylinder in his arms jerked back with great force; a bolt of fierce, blinding energy tore out of it and passed with the quickness of light down the length of the corridor.

When he could see again there was no corridor. Everything that had been in the way of the projector was gone, simply disappeared.

Unmindful of the heat from the object in his hands, he turned and directed it at the battleship that was plainly outlined through the space that had been once the walls of the derelict. Before the men on the deck could move, he pulled the lever again.

And the winds were silenced for a moment. The natural elements were still in fear at the incredible forces that came from the destruction of atoms. Then with an agonized scream the hurricane struck again, tore through the spot where there had been a battleship.

Far off in the sky Ennis detected motion. It was Shadden, speeding in a glider.

Now would come the work that was important. Shadden would take the big machine apart and see how it ran. That was what history would remember.

Coming in the October Astounding, Part One of Dr. E. E. Smith's "Gray Lensman." Make sure of that October number!

GENERAL SWAMP, C.I.C.

By FREDERICK ENGELHARDT

GENERAL SWAMP, C. I. C.

There was one general that outranked every human officer on Venus—General Swamp, which determined every tactic!

By Frederick Engelhardt

Part One of a new serial of rebellion.

Illustrated by Isip

THE face in the interplanetary television screen tightened in a thin-lipped, vindictive smile. The brown eyes were hard and piercing. Facial muscles hardly moved as the crisp, decisive words—words condemning the entire human population of Venus to virtual serfdom—crackled from the screen.

"And so," the voice went on, "by the authority vested in me as President of the Confederated States of the Americas, and with the consent and approval of Congress, I, Charles Louis Rutledge, hereby declare the inhabitants of the planet Venus in rebellion against the sovereign authority of the said Confederated States of the Americas."

Another face, equally immobile but tinged with expectancy, stared at the image in the screen. The president's words were not exactly a surprise to Brand Martel, but they brought a flush of anger to his browned cheeks. Corded muscles jumped menacingly along the young Venusian's square jaws.

"To facilitate the suppression of this rebellion, and to eradicate the widespread smuggling which fostered it, Congress has granted extraordinary powers to the private business organization known as the American-Venusian Corporation."

The jaw muscles tightened.

"This company," the crisp voice continued, "its officers and responsible employees are empowered to seize any person and property, to pass any and all laws, to declare martial law, to enforce the laws and to administer justice whenever and wherever it may be found necessary to accomplish the suppression of this rebellion."

Brand glanced sideways at his white-haired father. John Martel sat very still. The words that were a challenge to his strong, eager son were a death sentence to him. For they meant that the export firm of Martel & Son, a foundation stone of Venusian business and his life's work, was doomed.

The younger man's face clouded. He rose and crossed to the big open window. An ominous roar enveloped him, rising as an irresistible tide of anger from the crowds in the square forty stories below.

"The people aren't going to stand for it," he exulted. "Those power-drunk politicos on Earth have stepped on an interstellar banana skin."

"What can the people do?" asked John Martel sadly. "What can anyone do—against the power of the C. S. A.?"

"Fight," Brand snapped. "Fight. What we should have done three years ago."

All over Venus, in every one of the seven hundred-odd colonies, other men, young men, were saying, "Fight." It was the spontaneous, chorused answer

to President Rutledge's proclamation.

"Fight?" John Martel's tone was sympathetic. "You're mad. All you young people are mad. Do you think the handful of schoolboys, clerks, and drunken swamp runners who cheer your speeches can stand up against the armies of the Confederated States of the Americas?"

Brand laughed. "Earth is quite a few million miles away," he pointed out. "There aren't spaceships enough to transport the armies of the C. S. A., or even one of them. And Earth can't spare the ones she's got.

"No, we won't have to fight the C. S. A., just the American-Venusian Corporation—and then only their hired mercenaries. This isn't any surprise to us. We've expected it for some time, and are prepared for it."

"You refer to the Intra-Venusian League, of course?"

"Of course. We've been working for a split with Earth for years. This only means that our goal will be reached sooner."

"I don't like it," John Martel sighed. "After all, we all came from Earth. That is our home."

"Venus is *our* home," Brand declared vehemently. "We were born and raised here. We don't know any other planet —and don't want to. Besides, what has Earth meant to us in the past hundred years, except as a place to send our troops to fight someone else's battles? And now they expect us to pay their debts, too."

"Those battles on Earth were fought for us, too, Brand."

"Damn little we got out of them. Even if the Americas hadn't won the war, what would that mean to us? Do you think Europe or Asia would send an expedition to take over Venus, too? They'd get the same reception the Corp is going to get."

"What about our markets, then?" John Martel asked. "We have to maintain some commerce, or our standard of living goes blooie."

"Don't worry about that. Earth will always need *aphroditium* and *burlon*. That's why we've been so successful smuggling. Besides, dad, just *what* do you think we'll gain by our commerce, anyway, with the Corp in full control? No, you and other older men will have to come around to our way of thinking. This movement has too much momentum to stop now."

THE interoffice televisor on the big desk glowed and a dark-haired girl, pretty, but with her red lips twisted in a grimace of distaste, appeared on the screen.

"Yes," John Martel said dully.

"There's a person calling himself Deputy Crandall, of the Corp, to see you," the girl said.

"Send him in," Martel told her.

To Brand, he added: "I didn't expect one of them so soon. They're not losing any time."

A door slid silently into its groove and a huge, corpulent individual waddled into the room. Deputy Crandall was garishly attired in a red-and-yellow outfit of burlon cloth, woven from the light, strong, waterproof fiber that was Venus' chief export.

Despite his burning feelings, Brand was moved to amused contempt. The newcomer perspired profusely and tugged continually at his loose-fitting shirt and shorts, a sure sign he was a newly arrived Earthman. Venusians and old residents were used to the superheated climate.

"You're from the Corp, I understand," John Martel said. "Let's see your credentials."

"I'm Jonas Crandall, of the export division of American-Venusian. I don't need any credentials. It's enough for you to know I'm taking over this concern. Now hop out of that chair and bring me a record of all the aphroditium

and burlon you have on hand. I want to make up a shipment at once. By God, we've got you damned Venusians where we want you now."

John Martel flushed, but rose slowly to obey. Brand still stood by the window, a dangerous scowl on his dark face.

"Well, what are you waiting for?" Crandall barked at him. "Get busy with this old codger, and wipe that scowl off your face. I'll have discipline around here."

John Martel turned and a warning sprang to his lips. "Brand! Don't!" he cried.

But Brand was already halfway to the big desk. Before the fat official could raise a pudgy arm to defend himself, a hard-driving fist caught him squarely on the mouth. He went over backward, spitting blood and teeth.

"That's just a sample for the Corp," Brand snarled. "Take this for yourself."

He jerked the big man to his feet and hit him again, with a left and a right. The big man collapsed on the metal floor with a squishy sound.

"My God!" the elder Martel cried. "Now you've done it. You'll go to the disintegration cell for this. Why couldn't you hold your temper?"

"Hold my temper! Listening to *that?* And as for disintegrating me, they'll have to catch me first. And if they do, slamming a bloated leech like this in the mouth will be a minor detail."

"Where are you going? Where on Venus *can* you go? You've seen here how quickly the Corp acted. They've probably got every colony under control by now."

"I doubt that. They're not as strong everywhere as they are on Arkgonactl. Anyway, there are always the swamps. I'll have plenty of company. Every other fighting man in Venus will be doing the same thing. In a month we'll have these slugs kicked off Venus. Come with me, dad."

"No," the older man said. "I'm too old for campaigning. I can do more good here. Maybe I can square this for you if things go wrong. After all, the Corp can't hope to run everything on Venus. They'll have to depend on us."

He held out his hand and Brand gripped it. "Good luck, son," he said. Brand smiled and left. The door slid shut behind him. Many weary months were to pass before John Martel saw his son again.

As he passed through the outer office, Brand was deluged with approving smiles from the girl clerks. No lack of patriotism among them, he thought. Marie Larue, his father's secretary, flung her arms around him and kissed him.

"We saw it all, Brand," she said. "The televisor was still switched on. I hope you broke his fat neck."

BRAND quickly realized that slipping out of Wallacetown unnoticed might be easy, but would not be without risk. As soon as he stepped from the building he was caught in the rushing current of a mob fleeing from the bullets of a detachment of Corp soldiers. A block away he caught hold of an ornamental projection, drew himself up and looked back. Except for gold-uniformed mercenaries and scores of still, limp figures, the big square was empty.

"By God, this will wake up the people," Brand told himself. "The Corp is defeating itself."

Another block onward, then he elbowed his way to the edge of the human stream and cut down a side street. There were fewer people here, and only an occasional Corp sentry. The latter stonily ignored the boos and vegetables hurled at them by scampering boys. Veterans all of the long, bitter wars on Earth, they could smell blood in the air and had no intention of challenging the angry mobs singly. Brand noticed a

small, six-person monorail tram pull up alongside him.

"Hey, Captain Martel," bellowed the solitary occupant.

Brand recognized him, Sergeant Jack Green, who had served in Brand's company in the Venusian army corps recruited for service on Earth during the latter phases of the last war.

"Hop in, quick," Green said. The tram picked up speed and roared through the street. "Boy, am I glad I found you!" he added. "A Corp patrol raided the new headquarters of the Intra-Venusian League and grabbed the secretary and all the records. There are warrants out for you and me and every other member. Those boys aren't losing any time."

"Neither are we," Brand snapped. "Head for Bronto Inlet. Our yacht's cached out there inside that floating barn of Tom Dorgan's. I suppose the Corp's confiscated every other craft they could find."

"They've confiscated the whole damn city," Green growled. "I've been out since morning. A patrol grabbed me once, but I got away. You were right, captain. We couldn't hope to hold Wallacetown or even any of the island. The Corp is too strong here."

The light, streamlined car leaped ahead and was traveling at more than a hundred kilometers an hour when Green switched to a branch line at the edge of town and skirted the shore. Far out, moving slowly through the scum-covered swamp that inclosed Arkgonactl and its archipelago, were two gunboats —Corp guard ships.

"Hope we can duck them," Brand remarked. "I don't want to risk a fight just now, although the yacht is carrying all the guns I could put on her."

He leaned forward and peered through the *plastine* window. "There she is," he told Green, indicating a huge floating warehouse moored to the bank in an open strip of water.

The tram wailed to a stop as Green applied the magnetic brakes. The two men leaped out and Green sent the car whizzing back toward the city, knowing someone would stop it by whistling to the audio-magnetic control. It was only a few steps down the bank to the gangplank.

"Freeze, or I'll make sieves of the pair of you," barked a harsh voice.

"It's all right, Dorgan," Brand called. "It's me, Brand Martel, and Sergeant Green."

A tall figure covered from head to foot by a swamp-green burlon costume appeared in the doorway of the floating barn, long rifle at the ready. A glance at the two visitors satisfied him.

"Come on in," he called through the fine mesh that covered his face. Insects, both poisonous and annoying, were a problem in the swamps.

BRAND and Green entered Dorgan's living quarters, a single room carved out of the vast, burlon-filled interior of the warehouse, but holding all the tall swamp runner's needs, a bed, two chairs, a cold cache for food and a stove. Dorgan replaced his long-barreled rifle in its niche beside the bed and removed his insect armor.

"Got something to show you," he said. He crossed to a built-in closet. The door opened at his whistle and a greenish, securely lashed bundle toppled out onto the floor—a saurian aborigine, helpless, but still wearing his kind's usual venomous look.

"You can question him if you feel like, but he won't do anything but swear in Krokol." Dorgan removed a rope gag from the creature's crocodilelike snout and a torrent of harsh expletives rattled the interior of the room.

"Caught him swimming alongside my barge this morning," Dorgan said. "But that ain't all. Look at this, Brand." He took a short carbine from the bed

and tossed it to Brand. "He was carrying that in a waterproof case."

"A Corp army carbine," Brand snapped. "Now where in space did he get that? No Corp soldier ever goes where a Krokolian could get him."

He ran an experienced eye over the weapon. It was an old pattern, one of millions turned out on Earth during the past forty years and standard in the armed services. It was similar to the ancient powder-burning firearms, except that the stock was bulkier and a thick tube ran under the large-bore barrel. The stock contained an atomic-energy converter set, which disintegrated tiny slivers of metal in a charge of water in the chamber. The water, instantaneously converted to steam, drove the bullet, also automatically fed into the breech, through the barrel with terrific velocity.

Dorgan's berylium rifle, a type much more popular on Venus, burned aphroditium. It weighed half as much and had a smaller bore, but greater velocity and accuracy. All swamp runners carried these long-barreled rifles, and there wasn't one alive who couldn't bring down a flying *dactine* as far as he could see it.

"I think I know the answer to that, captain," Green said grimly. "I've heard rumors that the Corp is using saurians to spy on the smugglers. They can swim through the swamps and right up to a base where a soldier couldn't get within a kilometer."

"I can believe that of them," Brand said. "But, good God, man, they wouldn't dare. The penalty for selling or giving a Krokolian firearms is death, anywhere on Venus. A Venusian would shoot an offender on sight."

"Well, this one was carrying one," Dorgan said.

"Anyway, captain, the Corp is the law on Venus now, so what the hell do they care."

"What's that?" Dorgan asked. "Those bloated pains been up to something new?"

"Why, haven't you heard?" Green asked, astounded. "Didn't you listen to Rutledge's proclamation this morning?"

"I haven't got an interplanetary televisor here," Dorgan said. "And I never listen to politicians, anyway. What happened?"

Brand told him in a few words.

"Well, I'll be damned," Dorgan said. "So the Corp owns Venus and everyone on it. How come Congress made them a present like that?"

"It's simple to understand," Brand said. "When Congress needed money, and we wouldn't forward taxes, the Corp paid them three billion a year, in advance, for a trade monopoly and the privilege of farming taxes. For three years the Corp has had to compete with our smugglers and can't find anyone damn fool enough to risk a bullet trying to collect taxes here. So Congress is just making it easier for them. The C. S. A. must need that three billion pretty badly."

Dorgan, no whirlwind at sizing up political and economic situations, took several minutes to digest this while Brand and Green helped themselves to his food supply. Finally he spoke up.

"Well, whatever you propose to do about it, Brand, count me in," he said. Brand flashed him a pleased grin. Straight-shooting swamp runners like Dorgan were worth a platoon apiece in a fight.

"I'd suggest, captain," Green spoke up, "that we get the hell out of here. Dorgan's got a warehouse full of burlon here, and if I know my Corp officials, they'll pounce on it without waiting. They've got a lot of red ink to erase."

"They won't get this burlon," the swamp runner said grimly. "Before we leave I'll drop a thermite grenade in the lot. But what are we going to do

about Oscar here?" He indicated the bound saurian.

Green snorted and drew a heavy pistol from inside his shirt. Shooting from the hip, he put four bullets through the prisoner's scaly head. The others looked on unmoved. Too often had they seen the remnants of small colonies, *and* colonists, left by raiding Krokolian tribesmen. Dorgan pitched the corpse through a window, then opened a cleverly concealed trap in the floor, revealing the metal deck of a good-sized vessel swaying in the tide.

"I'll navigate," Brand said, dropping through the trap. "Green, you look over the engines. Hurry up with whatever you want to do, Dorgan. We're going places."

BRAND went directly to the control bridge at the fore end of the low, streamlined superstructure while Green scurried below. Like all surface craft on Venus, the vessel was built on the principle of the ancient sea sled, having a keel along each side and an inverted V bottom. Although a full thirty meters overall, with a beam of eight, and built of metal, she was extremely light, drawing less than fifty centimeters even when fuly loaded and moored. Her motive power was drawn from four light atomic-energy converters burning aphroditium and discharging through two rocket exhausts.

A twitch of Brand's wrist and magnetically controlled doors rolled up at the end of the twin-hulled barge, exposing the narrow slip in which the yacht nestled. Brand moved the vessel ahead a little and sighted along a row of double-tubed ray guns. The open passage through the swamp to the sea was clear. A crackling noise sounded overhead and there was a thump as Dorgan, clutching his beloved rifle, dropped to the deck. The yacht, sardonically named *Arkol Taxpayer,* because, as Brand explained, nothing could catch her, slid out of the tunnel into the light of day.

"I sure hate to see the old girl go," Dorgan said sadly, looking back at the blazing warehouse, "but I reckon more than that barge will burn before this is all over."

"Including us, maybe," Green put in, coming up from the engine room. "Captain, you see that Corp guard ship cutting into the channel behind us?"

"I see her," Brand said, gesturing toward a stern-view screen set over the control panel. The other craft, somewhat larger than the yacht and bristling with even more guns, swung into the yacht's wake. Her bow immediately lifted as she came plunging after them.

"No fighting today," Brand barked as the husky ex-soldier and Dorgan started for the after battery. "We've got more important things to do. I'll shake that patrol."

He turned back to his instruments. The speed of the yacht suddenly increased to fifty, seventy-five, a hundred and then one hundred and fifty kilometers an hour. Still the guard ship hung on behind. Bronto Inlet had long since disappeared behind them in the ever-present mist, and before them stretched the seemingly endless blue channel, walled in by the abysmal green swamp.

Brand was peering intently ahead. To Green's worried, "They're still right behind us," he nodded in satisfaction. Then, without warning, he gunned the port rocket tube and the yacht spun half around and plunged through a green wall of branches, scum and moss. The ray guns were long since housed, and the low hull and streamlined housing, built for just such travel, slid easily through the almost solid growth.

Dorgan, glancing ahead, saw they were following an old, half-choked channel. Looking back again, he saw the guard ship crashing through the vegetation only a few hundred meters behind them. But Brand, although he

must have seen the pursuing ship in the screen, was smiling.

On and on they went, deep into the dismal swamp. Whiplike branches lashed the elusive superstructure, and sunken tree trunks tossed the speeding vessel half out of the water. A whistling crackle sounded over them, then alongside, and trees burst into flame.

"They can't do any real shooting while they're tossing around in our wake," Brand remarked. "And this

Brand Martel knocked out the man—and knocked himself into outlawry with the blow!

bucket is made of berylium, so their magnetic aimers are no good."

For another fifteen minutes the hurtling vessels crashed through the virginal swamp growth. Occasionally a small, rocky island, sometimes inhabited, flashed past. And once a too curious bronto, rearing his ugly, fathom-long snout out of the water directly in the yacht's course, narrowly escaped destruction. And still, in the screen above Brand's head, hovered the guard ship.

"Dorgan," Brand called, "you remember that rocketship that crashed out here two years ago? We nearly piled up on her hulk at low tide."

"Sure, I remember, Brand. Right near here. She crashed with her magnetic brakes on full and turned over. And by all the planets and stars, they must be working yet. She had a full fuel load."

"Exactly. I'm heading right for her —and over her."

"Well, you said this boat was berylium. They won't affect us. But— Ho! I get it! Watch this, Green. This is going to be good."

CHECKING his course again with the regular radio beams against the automatic recording chart before him, Brand turned his attention to the hypersensitive fathometer. The needle, influenced by every stone and sleeping reptile on the bottom, trembled at sixteen meters. Suddenly it shot up to less than one meter, then dropped back to sixteen.

"That was it," Brand said, smiling coldly. He cut the speed and turned to the stern window. Green and Dorgan already had their eyes riveted on the pursuing guard ship. Uniformed men ran along the foredeck of the latter as the ray guns came out of their housings.

"Boy, they don't know what they're in for," Green, since enlightened, exulted. "They're almost on it. Hope their instruments don't give the wreck away. Nope. There they go. Right on their nose. Boy, oh, boy, look at those Corp butchers fly through the air."

Half the guard ship's crew were catapulted into the slimy swamp as the warship's stern came up and over, only to whip back again like a lash as the powerful magnets of the wrecked spaceship clutched her nose. Her stern exhausts spat futilely into the sky.

"It's tough on those boys who went in the water," Brand remarked, as half a score scaly heads appeared above the surface and moved toward the struggling crew.

"Yeah, it's too bad," agreed the hard-boiled ex-sergeant. "Well, where to now, captain?"

"Back," Brand said. "Some of the other League members must have eluded the Corp patrols. They'll probably be hiding out in the swamp. We'll pick up a crew before heading for Torgutkluck."

"That where the army is?"

"That's where the army is going to be. The Corp didn't catch us entirely off base."

Back at Arkgonactl they cruised along the shore for more than an hour before the keen-eyed Dorgan let out a hail.

"There's a couple, Brand," he hollered from the top of the superstructure. "A little off our port bow, beyond that pile of stink-flowers."

A few minutes later a dozen nearly exhausted Venusians climbed aboard the *Arkol Taxpayer*. One was Rod Whitlock, treasurer of the Arkgonactl chapter of the League.

"Someone betrayed us, Brand," he said bitterly. "We moved the records only last night, and changed our meeting place. But the Corp patrols hunted down almost every member. I don't think a hundred of us got away. We've been dodging Corp guard boats all day in this little runabout."

"We haven't enough men to fight this ship," Brand mused. "But we can, and

will, get to Torgutkluck. That's the rallying place. We'll organize there and come back—as an army."

"Something coming in on the televisor," Green interrupted.

All eyes turned to the screen set in the forward wall of the main cabin. Green spun the adjusting dials, and a sharp, scarred face appeared.

"Calling Brand Martel! Calling Brand Martel! Answer me, Brand!" crackled from the screen.

"It's Niki Willis!" Brand exclaimed. "And he's calling from the main Torgutkluck station, from the strength of that projection. They've had luck, anyway." He stepped in front of the screen, and the eager Green cut him in on the two-way transmission, hurling his voice and features over fifteen hundred miles of Venusian ocean. "Go ahead, Niki," he said. "It's all right. We're at sea."

"Glad to hear that," the other replied with relief. "Thought you were caught with the others on Arkgonactl. We heard about it."

"We couldn't do a thing, Niki," he said. "The Corp had the fight in the bag before it started. There wasn't even any shooting to speak of. How are things with you?"

"Under control," Willis grinned. "The Corp garrison are in their own cells. We've got the whole archipelago and fifty spaceships in the port here. The whole place is under arms and more men streaming in every minute."

"We'll be with you by morning," Brand said.

He returned to the controls and, with the aid of Dorgan's uncanny knowledge of the great swamp, worked the ship through the morass to the open sea. After their experience with the guard ship, Brand didn't care to risk the regular channels.

Once clear of the swamp, Brand set the automatic pilot on a great-circle course for Kardigan, chief port of Torgutkluck, and rolled into his bunk. The others, worn out, were already sleeping in the rays of the ultraviolet lamps—so indispensable to humans on Venus, where the direct rays of the Sun never reached the surface. Meanwhile, the ship roared on at a steady two hundred kilometers an hour over the placid sea.

THE cloud blanket overhead was a bright pink when Brand rolled out of his bunk and checked the ship's position. Swiftly he routed out the others.

"We'll be in port in twenty minutes," he told them.

There was a thunderous roar overhead and long streaks of scarlet appeared in the clouds.

"Rocketship coming in from Earth," Brand commented. "Hope she's carrying tools and dies. That's what we need most right now. We've got to get our manufacturies started again, before the C. S. A. space fleet blockades us."

The tall towers of the city soon loomed through the morning mist. Although not as numerous as those of Wallacetown, they were an imposing sight, seeming to rise straight out of the watery waste. Cross currents kept the main island of Torgutkluck clean of the omnipresent Venusian swamps, although farther north the archipelago was virtually lost in a primeval watery jungle.

"Good thing we saved Torgutkluck," Whitlock said. "Better for us even than Arkgonactl, what with the aphroditium mines and factories."

Torgutkluck, despite its size—it was the second largest island on the planet—was sparsely inhabited. Most of the residents worked in the mines or in the numerous factories. The latter, deprived of their livelihood by the Corp's monopoly, were ready converts to the cause of freedom. The miners were always ready for a fight. For this reason the rebelling Venusians had picked

Torgutkluck as their provisional headquarters.

A lieutenant and several squads of grinning riflemen greeted the yacht as she slid alongside an empty dock. Brand switched on the magnetic moorings and stepped ashore.

"I'm Captain Martel," he told the lieutenant. "Colonel Willis is expecting me. These other men escaped with me from Argonactl."

The officer relaxed and the men grounded their ready rifles. "We couldn't take chances," the lieutenant said. "Already this morning we've grabbed three boatloads of Earthlings who hadn't heard about the revolution. They were out fishing overnight. You'll find the colonel in the Administration Building, straight up the street from the dock."

Brand left Dorgan in charge of the boat and boarded a tram with Green and Whitlock. A few minutes later he was shaking hands with Niki Willis and exchanging stories.

"There wasn't much to it," the latter said. "We had already armed most of the factory hands and miners, and had landed five hundred swamp runners Martin Vivian organized outside. We caught the Corp garrison at dinner, and the barracks were in our hands in fifteen minutes. We lost about thirty men and they about a hundred, mostly sentries and patrols too dumb to surrender. We've got seven hundred or more prisoners."

Brand then introduced his companions to the famous Willis, who had thrown up a commission in the regular army on Earth to side with the Venusian rebels. Willis shook hands with them. There was little "pulling rank" in the Venusian armed forces.

"Glad to have you with us, sergeant," Willis said. "God knows, we need men with military experience. I'll see to it you get your captain's bars today."

The veteran sergeant's seamed, leathery face broke slowly into a happy, if surprised smile. He straightened his shoulders even more, and the light in his eyes boded no good for the enemies of Venus.

"What about me?" Whitlock asked. "I'm ready for a fight."

"I don't doubt it," Willis answered with a grim smile. "But I think you'll be more helpful to the Provisional Council. You've had more legislative experience than any of us. We're just soldiers. I'll give you a note to President Eihler."

WILLIS dropped back into his chair and ran a nervous hand through his thinning hair. He gave Brand a wry smile.

"There'll be damn little sleep or rest for us," he said. "We've got ten years' work cut out for us, and ten days, maybe, to do it in."

"What do you want me to do, Niki?" Brand asked.

"Here." Willis tossed a roll of metallic paper into the other's lap. "There's your colonel's commission. Approved by the Council this morning. All you have to do is make an army out of a mob of independent, hell-raising miners and mill hands."

"Bad as that, eh?"

"Bad is no word for it, Brand. It was easy to whip up enough enthusiasm among the men to attack the garrison here, but now they think they're through. They're satisfied they've told off the Corp."

Brand went thoughtfully over to the window. Out beyond the near edge of the town, the lush, clogging green of the swamps began, blotting out all sight. He turned abruptly to Willis.

"Niki," he sighed, "it doesn't make a damn bit of difference what the Council says, or who they say runs the army and plots the tactics. There's just one set-up possible, and that's one handed out by our superior general—General Swamp, commander in chief."

Willis looked up and out at the solid, impenetrable wall of green. "Hm-m-m. General Swamp, C. I. C. I think you're right—but he's a traitorous old scoundrel. He dictates tactics and strategy for both forces in this war."

Brand chuckled. "Ah, but he doesn't dictate in good English speech; he talks the native tongue of Venus. A rustle of jungle growths and a gurgling of swamp water. Our men know his language better—and he's the greatest tactician of this world! We'll win if we follow his strategy—and die if we don't!"

The door slid open without warning, and a grimy, half-naked miner sauntered in, trailing a rifle.

"I'm going home for lunch," he told Willis. "Be back in an hour or so if you want me."

"What was that?" Brand asked when the other had left, after propping his rifle in a corner."

"That," Willis said wearily, "was my orderly. He was told to remain on guard outside the door. He should be shot, but there's nothing I can do about it."

"I'm beginning to get the idea," Brand said. "In a way, I was afraid of something like this. Niki, we've got to instill patriotism in these men, or they'll be worse than useless. We've got to have a disciplined army, no matter how small."

"I hope you have some ideas. That's going to be your job. And I'm telling you again, you've only got a few days. The Corp isn't going to make us a present of Torgutkluck. The mines here spell money to them. We'll have an expeditionary force from Arkgonactl on our necks inside of a week, or I'm a bookkeeper."

"How about the women?" Brand mused. "How's the spirit among them?"

"Couldn't be better," Willis said. "The League auxiliary here is raising its own regiment. They're meeting today in the stadium. But we can't send women to fight professional soldiers, and veterans, at that."

"Well," Brand said, rising, "I'm off to work. How do I get to the stadium from here?"

"What the hell are you going to do at the stadium? Your army-to-be is out at the Corp barracks, north of town."

"I'm going to exercise my wiles, Niki. For the salvation and glory of Venus, I'm going to become a glamour boy. Where do I draw a uniform? Something snappy."

A TRAM deposited Brand outside the entrance to the stadium half an hour later. He was immediately challenged by a pert young redhead lugging an ancient musket as tall and heavy as herself.

"I'm Colonel Martel," he said, eying the weapon. He noticed the antique was on the full cock, and hoped it wasn't loaded. "Where will I find Mrs. Mabel Winsted?"

"*Colonel* Winsted has to make a speech in a few minutes," the girl told him. Then, after examining Brand with a critical eye and registering approval: "But you can catch her in her private office. Turn to your right. The door at the end of the hall."

"Thanks," Brand said. He walked quickly along the corridor until he heard a number of female voices raised in a loud wrangle. "This must be it," he told himself. He opened the door and found himself in the midst of about twenty women, all of whom were talking at once. Scanning the room, he picked out a blue cap bearing a gold dactine, the huge, fierce, armored bird of Venus and the insignia of a colonel.

He wriggled through the group and introduced himself to "Colonel" Winstead. The others stopped talking.

"I've come to ask you women a great favor," he said, trying to season his solemnity with just the right propor-

tion of smiling encouragement. "Venus needs help—help only you can give."

"Anything, colonel, anything," came from the back of the room. Brand noticed the speaker was young and attractive, and busy pushing her hair into place under her tiny cap. For the first time in his life Brand was thankful for his good looks. They were making his job easier—and, after all, it was for Venus.

"Command us," declaimed Mrs. Winsted. "We women are ready to shed the last drop of our blood for freedom."

"I am sure of it," Brand answered, bowing in tribute. "But I trust we can preserve your fair hands for the task of building a new Venus.

"Out at the barracks," he went on, "are your men. They fought nobly yesterday and won a great victory. But one victory does not decide a war. The Corp has ten thousand men under arms on Arkgonactl. They will be here in a few days to try to bring Torgutkluck again under subjugation. Will you permit that?"

"No! No! Never!" the women chorused.

"Then I'm asking you to go out to the barracks and convince your men that they must submit to discipline, and obey army regulations, and to learn at least the rudiments of warfare. I know how you and they feel about discipline, but the Corp mercenaries are disciplined, and the army of Venus must be disciplined, too. Take my word as a soldier for that."

"Of course, we'd like to help you, Colonel Martel," Mrs. Winsted said. "But what about our regiment? We haven't much time to organize as it is."

"Colonel Winsted," Brand said fervently, "my officers and drill sergeants are yours to command. Out at the barracks they can help you whip your regiment into shape in one tenth the time it will take you here. And your presence will inspire the rest of the army."

"We'll accept your offer, colonel," Mrs. Winsted said. "But as long as you are here and the regiment is assembled, I think it would be nice if you said a few words to them. Don't you, girls?"

The motion was carried unanimously and Brand found himself being hustled to the speakers' stand at the end of the stadium, escorted by a giggling guard of honor. Historians left out a lot when they wrote of revolutions and the men who led them, Brand reflected glumly as he repeated his appeal to the two thousand women gathered in the stadium.

"I KNEW you'd do it," Willis remarked to Brand three days later. "But I still don't understand how."

"They'll never be mistaken for Presidential Guards," Brand said as the army of Venus marched and wheeled in formation below them. "But they'll defend Torgutkluck, and that's all I'm asking right now."

The two were standing in the command control chamber of the barracks, the brain of the Torgutkluck defense system. The center of the room was taken up by a huge relief map of the Torg archipelago, electrically operated from the message room below. A huge televisor screen, capable of reflecting an entire battlefield, occupied one wall. Other individual screens studded another wall.

From here a commander could personally keep an eye on any engagement within a radius of five hundred kilometers. It was a tribute to the skill of the Corp's signal engineers.

"They'll have an opportunity to do some defending before many hours," Willis said. "Intelligence just reported a huge Corp fleet left Wallacetown this morning."

"I know," Brand said. "But most of the ships are old freighters. They can't do better than fifty kilometers—not in convoy. It'll take them two days to

get here. And every hour counts with us."

A loud *bzzzzz* drew their attention to a small report screen. It glowed, and the lean, narrow-eyed face of a veteran swamp runner appeared.

"Reportin' from the swamp off Amon Island, Brand," rasped the swamp runner. "Just ran across a patrol from a Corp guard ship. Eighteen soldiers, two Venusian guides and a lieutenant."

"Did you get any of them, Mac?" Brand asked eagerly.

"All of 'em."

"Well, send them on to Torg."

"'Fraid we can't do that, Brand." The swamp runner seemed embarrassed. "They won't keep that long. And we ain't got any way to embalm 'em."

Willis snickered. Brand's jaw muscles flexed.

"Damn it, Mac!" Brand roared. "I told you I want some prisoners. And information. Was that guard ship alone?"

"She is now," Mac replied. "But she ain't goin' to be long. We're cutting around the island after her."

"And don't forget—" Brand started.

"I know. I know. You want a prisoner."

The lean face vanished from the screen.

"WELL, that's the right sort of reception to give the Corp," Willis said.

"Yes," Brand conceded. "Those swamp runners fight well. And they shoot straight. But you can't tell them anything. If we're going to lick the Corp, it'll be in hand-to-hand combat. We can't depend on strategy too much, not with these rugged individualists."

"They'll learn, Brand. Give them time. You've done wonders right here in a few days."

"But we haven't the time to give them, Niki. We've got to win this war inside of two months. If it drags on after that, the Corp will start sending reinforcements from Earth. Regulars, too, probably. And we still won't have an army, as such, to meet them."

"Things aren't going so badly, Brand. Have you heard about Golubhammon? The boys there have the Corp garrison —what's left of it—bottled up in a fort clear out on the north end of the island."

"Yes. That's encouraging. But Golubhammon is nothing but a big burlon plantation, anyway. What I'd like to hear is that they're sending us a thousand men or so, to help us on Torgutkluck."

"Well, that's a Venusian for you, Brand. Let every man shoot his own meat. It will take a long time to get the different colonies to pull together."

The door opened and grizzled Martin Vivian, leader of the swamp runners, entered.

"By the way, Niki," Brand said, "we're going to have a navy. Vivian here will command it. He's as good a sailor as he is a swamp runner."

The stocky, rugged newcomer grinned through his beard.

"It's some navy, too," he boasted. "The fastest ships on Venus, and the best ray-gun crews alive to man them."

"Think you'll be able to stand up to the Corp guard fleet?" Willis asked. "They're real men-o'-war, built on Earth by experts and assembled here."

"Well," Vivian replied slowly, rubbing his hairy chin, "they carry heavier guns, it's true, and maybe more of them. But we won't fight according to their rules."

"Give me the latest dope," Brand ordered.

"Thirty-seven seagoing ships, including your own yacht. Dorgan's commanding her, you know. Five of 'em are out now on patrol. Got about seven hundred men, all told."

"All swamp runners?"

"No. Half of them I picked up here. Engineers and so forth."

"All right, Vivian. Here are your

orders. The Corp fleet left Wallacetown this morning. General James Boonton is commanding the army, and he's probably bringing all the men he can muster. That means about twenty or thirty transports, plus most of the Corp fleet.

"Your job is to find the convoy and harass them. Delay them all you can. Every hour we gain strengthens our position."

"We'll play tag with them all over the Blue Ocean," Vivian said. "I know where to pick them up. Who's commanding the guard ships? Old Man Mullins?"

"Willis nodded. "That's what Intelligence tells us."

"I know him," Vivian nodded. "Fought alongside him on Earth and against him here on Venus when I was running aphroditium to the smugglers. He's as dumb as they come. It'll just be a work-out for the boys."

"A good man, Vivian," Willis said when the other had stalked out. "Best fighter we've got. And he has brains, too."

"Now that that's taken care of," Brand said, "let's get down to business here."

They both turned to the huge map and for an hour discussed possible plans for defense.

THREE DAYS later Willis and several other staff officers hurried into the control chamber.

"So it's come, eh?" Willis said.

"We can expect action any minute," Brand told him. "Vivian reported an hour ago that the Corp fleet was less than a hundred kilometers from our north coast.

"Look at this map here. Here's the fleet, and Vivian's. They'll probably attempt an immediate landing. There aren't any sizable islands off that coast Boonton can use for a base."

"How do you know he'll try to land there?" Willis asked. "Torg has a long coast line. In the north the island is still pretty much jungle. If he goes south, he'll have open plains on which to maneuver."

"True," Brand said. "But look here. To the east there are hundreds of kilometers of dense swamp, with only a few islands. It would take Boonton a day or more to encircle it, and that would give us too much time to prepare, from his point of view. To the west there is only a narrow channel through the archipelago, and that's quite a ways offshore. He'd have trouble maneuvering his fleet off there.

"No, my guess is that he'll make a direct attack on Granagon. There's a good harbor there, and plenty of docks. Moreover, it's the terminus of a dozen rail systems."

"What preparation have you made?"

"Major Bela left for Granagon an hour ago with his battalion—five hundred men. Two batteries of mortars accompanied him. The second battalion is moving up to join him now. I'm holding the rest here, in reserve. They can be rushed there in time if they're needed. And, if I've guessed wrong, they'll be handy to any other point on the island."

"There's Vivian now," one of the other officers exclaimed as a report screen glowed.

"We're still in a running fight with the Corp, Brand," the bearded veteran said. "They've got a heavy battle squadron guarding the fleet and two fast cruiser squadrons screening them. We've been engaged with the latter all morning."

"Let's see the situation," Brand barked.

The big screen came alive, with rippling blue water seeming about to pour into the room. In the distance the watchers saw the big convoy, moving in a diamond formation, its edges lined with battleships.

In the foreground fast fighting cruisers tore up the surface of the sea as they dashed about, seeking targets among the enemy fleet and endeavoring to avoid the jagged, yellow streaks of high-voltage electricity hurled from opposing ray guns. Occasionally a blinding flash of light and a column of smoke indicated a hit.

"All right, Vivian," Brand ordered. "You've done your part. Split your fleet. Send half around Torg through the western channel to guard the islands there. Take the rest into the swamp to the eastward.

"But that'll let the Corp right into Granagon," Vivian protested.

"I know that. You've got your orders. Your ships will hold our flanks."

On the big screen the Venusian fleet divided and raced in opposite directions. The lighter Corp vessels started in pursuit, then wheeled and raced straight toward the watchers. The scene changed as projectors on the solitary hill behind Granagon picked up the advancing foe, and Brand could see the fleet was still half an hour from the port.

"That's his objective, all right," he said. "Captain Green, order the rest of the troops to Granagon. All artillery as well. We'll fight on land, in the jungle. The Corp fleet's ray guns will be useless then."

"Are you going to stay here, Brand?" Willis asked.

"No need," Brand answered. "An observation post on that hill will enable me to follow all actions."

FROM the hill the invaders presented an imposing sight. The harbor was filled with light cruisers, and the big, lumbering transports were edging toward the docks. The heavy Corp battlewagons remained outside.

"The mortars are all in position, sir," Green, glowing in his new officer's blouse, informed Brand. "Four batteries, eight guns each. The field guns are supporting our troops in the town."

"Very well," Brand said coolly. "Tell Major Gomez he can open fire on the transports at once."

Green snapped into a televisor. There was a series of muffled reports, followed by a prolonged *whoosh,* from the reverse slope of the hill. The watchers saw thirty-two hundred-kilo bombs arch over their heads, to fall with thunderous explosions in the exact center of the huddled Corp fleet.

"Duck behind the hill, Brand," Willis cried. "We can watch from the screens, and we'll be out of range of their ray guns."

Brand and his staff moved quickly, and not a split second too soon. As it was, two aids were caught by the raking barrage hurled at the hill by the enraged Corp sailors and turned to smoldering ashes.

In the screen Brand watched as the whole forward slope of the hills burst into flame and long crevasses appeared under the terrific electrical shocks. Gomez's mortars continued to hurl their terrible liquid-air bombs into the fleet with unerring accuracy, and there was no defense against them. Corp mercenaries were dying by the hundreds.

"He's got to land his men now," Brand declared jubilantly. "Even though he knows he's walked into a trap. He'll never get those transports back through the channel."

"God help them when they get into the swamp," Willis said. "There are about five thousand riflemen hidden there. But what about the town?"

"The women and children were evacuated early this morning. The men are remaining to defend it. And they'll fight like fiends."

Despite the rain of high explosive, the Corp officers, all, like the men they commanded, veterans of years of warfare on Earth, managed to get the survivors of their commands ashore. Here they ran into the deadly rifle fire of the en-

Brand looked at the Women's Auxiliary nervously—then spoke. He couldn't make those miners and swamp-runners accept discipline—but they could!

raged townsmen. More hundreds dropped, but the majority immediately sought shelter and started working their way inland. Gradually they disappeared among the houses and only the explosions of grenades and the occasional brief appearance of small uniformed groups marked the line of battle.

So terrific a bombardment could not be maintained for long, Brand knew, and therefore he was not surprised when Gomez's barrage slackened. Only one gun in a battery was firing now, while the others cooled. But the range was shortened and the bombs now fell along the water front.

"They've got guts, those Corp soldiers," Willis commented as the gold-clad troops continued to advance through the broken curtain of fire. His

cold, blue eyes were riveted to the screens.

"Guts won't help them now," Brand commented. "More likely get them killed the sooner. What's your estimate of their number?"

"I'd say around nine thousand, including the sailors landed from the warships. But their casualties must number one man in three even now. Good Lord, Brand, those troops were massed on the decks when the barrage caught them. And some of those transports sank so quickly there was no escape."

Through a pass in the hills below them moved a steady stream of wounded Venusians, indicative of the bitterness of the fighting in town. The veteran mercenaries knew what they were in for, and fought with a ferocity that matched that of the Venusians.

SHAKING OFF Willis' restraining hand, Brand ran down the hill and worked his way through the pass. A wounded sergeant pointed out the battle line, which by now wound irregularly through the town. Even as he spoke, a bullet whined between them and a small hole appeared between the sergeant's eyes. The whole back of the man's head popped open in the vacuum created by the velocity of the slug.

Brand dropped the corpse and wriggled forward under shelter of a line of houses. He found Major Bela behind a rude barricade in the center square of the town.

"We're delaying them, colonel," Bela said. "But we can't hold them. Too many of them. We need reinforcements."

A wasted company of mercenaries debouched into the street just ahead of them and started forward cheering. The long triangular bayonets on their carbines glittered. Two field guns mounted in windows behind the command post spoke and the stone houses on either side of the attackers crumbled into the street, burying them. A score of Bela's men immediately rushed forward and took up positions on top of the pile of rubble.

"I'll send you reinforcements, Bela," Brand said. "I want you to stop the attack here in town. I want to force Boonton to try a flanking movement. Once we get his men in the jungle the battle is over."

"All right," the major said. "We'll hold them. But you'll have to send reinforcements. I haven't got five hundred men left, including the townsmen."

Back at the hilltop command post, Brand contacted his wing commanders.

"Nothing doing here so far," old Colonel Wright reported from the left flank defenses, spread thinly through the heavy jungle. "We haven't seen a Corp soldier since the battle began."

"You will," Brand told him. "Just hang on and wait."

Major Grant, on the right, made a similar report.

"We have to force Boonton to spread out into the jungle," Brand told Willis. "The man's too canny to do it voluntarily. "Where's Gomez?"

Brand's dark, little, scholarly artillery chief hurried up from his mortars and saluted.

"The Corp has the whole water front," Brand pointed out, "and all of the city north of that wide avenue, roughly speaking. I want you to scatter shells all through that area. Understand?"

"The guns haven't cooled as much as they should, but I'll try."

He scurried away, and the mortars, more or less silent for the past half hour, opened up again. Great clouds of smoke and masonry from the ravaged town rose into the air.

"That'll pin Boonton down there!" Brand exclaimed. "Now he's got to make another move, and there's only one thing he can do."

"And there they go," Willis interrupted. "There's a full battalion run-

ning along the esplanade, under cover from fire. In the middle screen here. And another."

"Notify Colonel Wright to prepare to receive an attack," Brand barked at an aid. "This is the beginning of the end," he added to Willis. "I didn't dare hope Boonton would jump into another trap so soon."

BRAND resolutely squelched a yearning to join Wright's men in the jungle, where the culminating action of the battle would take place, and turned to his reports. It was a full job for a commander to even keep track of his various detachments under the circumstances, but the signal engineers, trained by the Corp, kept him in contact with the last company.

It was impossible for the Corp commander to conceal all his troop movements from the innumerable, hidden televisor eyes in the city, and Brand was able to tell within a score just how many men entered the jungle.

"He's sent about four thousand around our left flank," the young Venusian remarked to Willis, who had volunteered as acting chief of staff. "And a couple hundred around our right. That's only a diversion. Have Grant deploy a battalion to take care of them and send the rest of his men over to help Wright."

The artillery barrage suddenly ceased and Bela's men charged forward in the town. As Brand had expected, the Corp attackers were pinned down by the heavy shell fire, so much so they had no time to reform to meet Bela's charge. Inside of a quarter of an hour the wiry major reported.

"The town is ours again," he beamed from the screen. "We've killed most of them. Got several hundred prisoners. Moving artillery up now to engage the cruisers in the harbor."

Brand crept back to the crest of the hill and looked over the town. The cruisers, still moving around the harbor, were ripping the water front to shreds with their ray beams, searching for the Venusians dug in along the line of ruined warehouses and docks. But as a ray stopped at the first object it struck, the latter were comparatively safe. Then the Venusian field guns began replying and the cruisers withdrew out of effective range. Those transports that had escaped destruction were already well out from the harbor.

"We've engaged the enemy!" It was Wright reporting. Brand nodded into the screen and rejoined Willis.

"Well, it's all over, Niki," he said. "The mercenaries will never get out of that jungle alive, except as prisoners. No men from Earth can stand against Venusian marksmen in a wilderness like that."

"Yes," Willis said. "That's over. But now we have to follow up. And follow up fast. The real job is still ahead of us. We've got to wipe Venus clean of the Corp."

CONFIDENT that the swamp-wise Wright would be able to handle the enemy, and knowing that the scattered hand-to-hand fighting would last for hours, Brand descended again into the town with his staff.

"That Gomez scored the grand prize right off," Bela said, meeting them. "Look in there, inside that door."

The shattered body of General James Boonton, late of the central army of the Confederated States of the Americas, and commander of the American-Venusian Corporation's Legion of Guards, lay on the stone floor, only partially covered with a torn and dusty curtain.

"So that's why the attack fizzled so soon," Willis commented.

"See that he has decent burial," Brand told an officer. "He was a brave man and a gentleman, and did his duty according to his convictions."

"Vivian's fleet just hove in sight," Bela added. "He's driving off the Corp cruisers. Guess the war's over."

"The battle is over," Brand said. "The war is just beginning."

The island capital, New Buffalo, was in a frenzy when Brand and the others returned late that night. Lights blazed in every building, and crowds filled the streets, dancing and singing.

"Well, the Council finally decided on a planetary flag," Willis said, indicating the numerous gold banners, studded with nine ringed stars representing the main archipelagoes, that fluttered from poles and windows everywhere. "It's been worrying them for weeks."

The Provisional Council was assembled on a platform in the main square, guided by the women's regiment, which had been kept from the battlefield by a carefully arranged shortage of tram cars. Brand was summoned to the platform.

"Citizens of Torgutkluck, citizens of Venus," boomed fat, pompous President Eihler, "I want you to salute our hero, the man who wiped out the invading Corp army, the man who freed our homeland from all threats of subjugation at the hands of these bloodsuckers, the man who gave us our army and led that army, the man who—"

There was much more, but Brand didn't hear it. He had fallen asleep and had to be wakened half an hour later to accept a "small token of the appreciation of Venus." It was not until he returned to his quarters at the barracks that he opened the parcel. It contained shoulder straps bearing the four stars of the commander in chief of the army.

A buzz in his ear wakened Brand. Through the open window he could see the pink dawn breaking. Colonel Wright's seamed face stared at him from the report screen by his bed.

"The Corp attack through the jungle has been completely broken up," Wright told him wearily.

"Good," Brand said, feeling rather abashed at being discovered in bed. Poor Wright, the oldest officer on Torgutkluck!—he thought. The man must be dead for sleep.

"Sporadic fighting still going on. My men are gradually cleaning out the area. These Corp soldiers are sure diehards. They're fighting to the last man, with or without officers."

"For God's sake!" Brand exclaimed. "Didn't you offer them quarter?"

"*I* did, but the men didn't agree with me. We've only taken a few prisoners."

"Well, impress it on them. We want the Corp mercenaries to surrender. They won't if they think they're going to be killed anyway. I'll be right out there. Where are you?"

"At a hunting shanty on the Granagon River. Take tram route No. 17 to a small pink stone hill, then follow a footpath."

Brand barked a series of orders on his way to the rail line and bolted a scanty breakfast as his tram roared northward.

"I'm having loud-speakers sent out from the barracks," he told Wright. "I'll order our men to offer quarter to all who surrender. The mercenaries will hear it, too. They must be tired of fighting by now."

The order was grudgingly received by the Venusians, but obeyed. Discipline had been instilled in them to that extent. Within ten minutes a steady stream of prisoners began filing past the rude command post.

BACK again at the barracks, Brand called a council of war and invited the Provisional Council to attend.

"The hardest part of our job lies before us," he told the assembled officers. "We've got to hold the army together until every archipelago is cleared of Corp garrisons. We've got a fairly well organized army here on Torgutkluck, and it has proved itself in battle."

"But will it fight on Golubhammon, is that it?" President Eihler put in.

"To hell with the Golubs," announced a surly, black-haired captain. "We fought our battles without any help from them. Let them do the same."

Brand crossed the room in three strides and with a single jerk ripped the bars from the man's collar.

"As long as you feel that way, Captain Napoli, you won't be wanting these. I'll give them to some man who can use them."

"Why, you—" The other's hand flashed down to his pistol holster—and stopped there as four other officers seized him.

"You can go on home, *Mr.* Napoli," Brand told him with finality. "As you indicated, you have done as much as can be expected of you. Thanks."

"Whew," Willis breathed as the dark-haired man's back vanished through the door. "You took a chance, Brand."

"That goes for everyone else who is ready to quit now," Brand barked. "I don't want officers who are ready to quit as soon as their own front porches are swept. Every man in this army has got to be a Venusian first and a Torgol, or Arkol, or Golub second."

He turned to the Council, squirming behind him.

"Gentlemen, I sent you a memorandum the other day suggesting you, as representatives of all the colonies, create a planetary army, open to citizens of every colony and responsible only to the planetary government."

"Ahem, quite so, quite so," responded a Yakishikiki delegate. "We have been . . . ah . . . debating the matter, and it seems to me—"

"It seems to you that it isn't necessary, because Yakishikiki was taken over by its colonists the first day of the revolution, and you never had more than a small Corp outpost to contend with, anyway. That's it, isn't it?"

"It seems to me our gallant volunteers are doing a splendid job as it is," declared another delegate. "If we create a planetary army, as you suggest, we will have to pay the men, which means we will have to raise taxes, and we don't know how the colonists will react to that."

"Good God," Brand exploded, "did you think you could run a government without any taxes? We Venusians didn't revolt against taxes as such. We revolted against exploitation by the C. S. A. on Earth.

"And I tell you again, if you don't give me an army independent of the individual colonies, the revolt will die of inertia and the Corp will establish itself again, conquering the colonies one at a time. And remember, we haven't any too much time. Gentlemen, try to forget politics for a few minutes."

President Eihler, a shrewd statesman, despite his pompous, professional-politician manner, rapped for attention.

"General Martel is right," he declared. "We must have a central armed force. But the arguments you gentlemen advance must be considered, too. I suggest that we vote for a small regular planetary army and navy, to be paid by the planetary government. The colonies will be requested to furnish volunteer battalions if and as they are needed."

"How many men do you want, general?" asked the Yakol.

Brand caressed his unshaven chin thoughtfully. It was, he realized, a ticklish problem. Mentally he cursed all politicians.

"At least five thousand in the army, and a thousand in the navy," he said finally. "That's the smallest nucleus with which I can carry out a campaign."

The Council retired to another room and went into a huddle. Brand nervously paced up and down, and ignored both a svelte, scantily uniformed girl orderly and the lunch she brought him.

Willis slapped him encouragingly on the back.

"After all, Brand," he said, "you didn't expect the revolution to be all cheering and shooting, did you?"

The Council filed back into the room. President Eihler cleared his throat noisily.

"We have carefully considered your request, general," he said, "and we have decided that fundamentally your position is sound. But we feel that an army of twenty-five hundred men and a navy of five hundred is all the present government can afford."

Brand started to speak but Eihler held up his hand.

"The delegates have agreed, however, to request their home governments to raise and equip volunteer forces to function with the regular army when the occasion demands."

The Council beamed approvingly. Brand choked back the exclamation that rose in his throat.

"Thank you, gentlemen," he said. "My staff will draw up the necessary rules and regulations at once. I'm sure we can enlist the necessary men here."

"Ahem," interrupted the gentleman from Yakishikiki. "We've . . . ah . . . discussed that aspect of the situation, also. We think it would be better to . . . ah . . . distribute the posts in the armed services among the several colonies."

Brand gritted his teeth. Willis smiled wryly. The more experienced officers sighed gently.

WILLIS found Brand staring gloomily at a big map of all Venus the following morning. The map was almost obliterated by penciled lines and figures.

"Well, we've got the regular army under way," Willis said. "Four infantry battalions and two artillery. Skeleton organizations, of course. How's the navy coming on?"

"Vivian's admiral," Brand responded. "He's collected a planetary fleet of five armored gunships, more or less in condition to fight. God only knows what he's doing now. I've got my own troubles."

Willis cast his experienced and learned eye over the map.

"Doesn't look too bad," he said. "Torg is free. So's Yak. The Golubs still have their garrison cornered."

"Fighting still going on on Martablanging, Janusking and Hikelungert."

"Who's winning?"

"We are on Marta and Hike. Swamp fighting, of course. Janus is a flat plateau, and the Corp's having things pretty much their own way. South of the equator things are quiet. There are only a few scattered settlers there, anyway. I don't think there's even a Corp garrison. Just guard-ship patrols."

"What's the next move?"

"The Council hasn't told me yet," Brand retorted bitterly. "They're arguing among themselves. The delegates from Marta, Hike, Ark and Janus each want the army sent to their own colonies. The delegates from Gandlactl and Sungikiki want the whole navy sent south to chase the guard ships over the equator.

"I'm trying to map out a sensible campaign before those idiots compromise again. Best I can think of is to send an expedition to Golub and clean up there first. After all, that's the nearest archipelago. And maybe we can recruit volunteers there. The Golubs love to fight, anyway."

"Then?"

"Then we'll take the others one by one. By the time we reach Arkgonactl, the toughest nut we have to crack, we should have a sizable force."

"You want my advice?"

"Of course, Niki."

"The men are getting restless. Enlist one full battalion and a battery of artillery and send them to Golub at

once. I think we can get a couple of battalions of volunteers to accompany them. Another success will give you more of a standing with the Council. They can't holler too loud while we're winning."

"I'll do it," Brand said. "Hell, I'm the one who'll get the blame, anyway, if the revolt flops."

The prospect of steady, well-paid posts in the army was an attractive one to the youth of Torgutkluck, where the majority of the inhabitants had been unemployed since the Corp first came to Venus. Willis had little trouble filling the batalion from the ranks of the veterans, and that evening four transports left the harbor of Kardigan, escorted by two of Vivian's gunships under the command of Tom Dorgan.

There was a lot of *ahemming* and *tut-tutting* when the Council learned of this, but Brand brutally informed them the war wouldn't wait on debates. He followed up this advantage by wringing a concession from the delegates allowing him to recruit the army to two-thirds strength on Torg and letting the other colonies wait for vacancies.

Wright, now a major general, reported from Golubhammon the next day.

"It was a pushover, general," he told Brand. "The garrison was worn out by the siege, and after hammering them a little with our artillery, we just walked into the fort."

Martablanging and Hikelungert fell within a week, and Brand personally led a force of ten thousand men to Janusking. Here there was bitter fighting, as the flat, open country favored the Earthmen, but after a few reverses, the Corp general surrendered, knowing he could expect no help for months, at least.

"Well, now for Arkgonactl," Brand told Willis.

"And the end of the war," the latter said fervently.

IT WAS an imposing fleet that Brand led out of Kardigan harbor a week later. Vivian's fighting squadron led the way, reinforced by twenty privateers armed and manned by volunteers. The entire regular army, with the exception of small detachements stationed in the several colonies, and upward of ten thousand militia organized in colonial battalions of five hundred men each, filled thirty large transports requisitioned from local ship owners.

"That's the spirit of the new Venus," Brand exulted. "Men from every colony, united in a single cause."

"I hope," Willis said dourly.

"We can't fail now, Niki. There can't be more than three thousand Corp troops on Ark, including those who escaped from the other achipelagoes. And General Waters, who's in command now, was never an overbrilliant commander."

"What about the Corp battle fleet that escaped from Granagon?"

"They haven't any base but Ark, and they won't dare operate alone in mid-ocean."

"And what about the regiments of loyalists who've enlisted with the Corp? There must be five thousand of them. Intelligence says Waters has organized them into a full brigade."

"'Loyalists'!" Brand spat over the side of the *Arkol Taxpayer*. "No one yellow enough to sign up with the Corp is worth considering in a fight."

"I only hope you're right, Brand," Willis said. "But I wouldn't disregard them completely."

Willis' forebodings were justified two days later when a scout ship, a hundred kilometers in advance of the fleet, flashed back an excited warning.

"The whole damn Corp fleet is out to meet us," rattled off the youthful captain. "Six big battleships and maybe a dozen cruisers. They're coming up fast."

"Come on back," Brand ordered.

"That's what we're doing."

Through the television system Brand called an immediate council of war, ignoring the bleatings of the committee of delegates accompanying him on the *Arkol Taxpayer.*

"I'm ready to fight!" Vivian exclaimed unnecessarily. "But you'd better have the transports circle the battle area. I can't protect them at the same time."

"You can't stand up to the battlewagons," Brand protested.

"Leave that to me," Vivian said calmly. "I just want about a hundred extra men on each of the fighting ships."

"O. K., Vivian," Brand said. "You're the admiral. I'll order the men transferred at once."

The transfer was quickly made, as the majority of the volunteer soldiers felt they would be safer on a fighting ship than on an unarmed transport. Vivian grinned knowingly in the screen when Brand informed him of this. The main body of the convoy then changed course and swung away in a wide circle. The *Arkol Taxpayer,* with Brand and the protesting delegates aboard, joined the fighting squadron.

"Here are your battle orders," Vivian, serious now, barked through the screens. "The Corp have their cruiser squadron in the lead, covering the main battle squadron. They outnumber us, but that can't be helped.

"I'm telling off twelve ships to tackle the battlewagons. You won't be able to outshoot them, so you'll have to jump them and take them by boarding. That hasn't been done in four hundred years, so I'm hoping it'll work. I'll lead that detachment myself."

Vivian ratled off a list of names, and Brand noticed he had picked the largest but lightest-armed vessels, nearly all privateers. They were, however, all overmanned with fighting swamp runners and smugglers, even excluding the extra contingents of land troops.

"Captain Dorgan will command the rest of the fleet. Two fast boats will lay down a smoke screen across the battle line just before we engage the enemy. That will give the other section a chance to slip around the enemy's wings and come up behind the battle squadron. They're slow ships, anyway."

Brand could not find a flaw in Vivian's reasoning, and again was forced to admire the resourcefulness of the short, bearded adventurer. It was such men, proud and independent, but farseeing and patriotic, who would make the revolution a success, he told himself.

Venusian ships travel fast, and it was only a matter of minutes before the far-flung Corp fleet loomed before them. Brand saw a ship on either end of the Venusian battle line dart ahead, then turn and head for each other, belching great clouds of heavy black smoke from their exhausts.

"All right, Dorgan," Vivian exclaimed, "you're on your own now! The rest of you split up. Ships on the right follow me. The others follow Brand Martel's *Arkol Taxpayer.*"

BRAND, taking the controls himself, swung out of line and roared westward along the black bank of smoke. Five other ships streamed behind him. A minute passed and he was clear of the smoke and turning north. Yellow flashes in the murk told that Dorgan had gone into action.

"There's the battle squadron!" Green exclaimed.

"I see it," Brand said. "We're running past the line and coming up astern of them."

The six battlewagons of the Corp fleet, small compared to the floating steel forts of the twentieth century, but immense alongside the squat, stubby Venusian sea sleds, were strung out in single file, the flagship in the lead. Streaks of light crackled over the blue water as she opened up with her heavy ray guns,

but the range was too great for accurate shooting.

"Probably think we're trying to run past them under the cover of battle," Brand said. "Well, let 'em. They'll learn soon enough."

Vivian's face appeared in the screen. "Now," he barked.

Every ship in the double line spun at full speed in a wide turn and bore down on the Corp vessels at an angle. Excited figures appeared on the decks of the battlewagons—sailors rushing to man the after ray guns.

Brand found his hands full and was forced to ignore the rest of the action. From now on it was every man for himself. His opponent was the last ship in the line. Opposite him raced a big privateer, her crew sprawled on the decks for safety.

The *Arkol Taxpayer's* port ray guns went into action, their crews trying to overcome or at least minimize the fire from the battlewagon. Brand saw a dozen figures on the deck of the other vessel vanish in puffs of smoke, then his own bow gun glowed and sagged into a shapeless mass of metal in the center of its incinerated crew. But now they were alongside the towering Corp ship.

"Boarders away," Brand roared, switching on his magnetic moorings to glue the two ships together.

Venusians by the scores leaped from the decks of the *Arkol Taxpayer* and poured over the side of the battlewagon. The first few Corp sailors to oppose them were shot down or clubbed into submission. The battlewagon reeled as a crash of metal on metal told that the privateer had taken her from the other side.

"After me," Brand thundered, leading the way to the fighting ship's control bridge. Atomic pistols *spanged* in the steel corridors, then knives, clubs and fists came into play as the crews tangled in a murderous free-for-all. Door after door splintered before the resistless advance of the Venusians, until only the officers on the control bridge were putting up any resistance.

"Damn you rebels!" bellowed the frantic captain. "We'll take you to hell with us! Gunner, fire the liquid-air magazines!"

The Venusians reeled back with cries of alarm and started jumping back aboard their own vessels. Even Brand was struck cold by the terrible threat—he knew the battlewagon's commander, faced with the ignominy of defeat, would do as he said. Then his eyes lighted on an unmanned ray gun just forward of the bridge, one of the ship's secondary battery.

"Here," Brand roared, "give me a hand here."

He leaped to the breech of the gun and started swinging it inboard, training it on the bridge. His shadow, Green, appearing from nowhere, was doing the same with the starboard companion gun. Others, sensing the idea, joined them.

Rippling, blinding sheets of electricity, guided by the invisible ultraviolet and infrared beams from the twin barrels, broke on the reinforced duraluminum armor of the bridge. The light metal glowed, then fused, and began dripping onto the deck. Those inside, Brand knew, were instantly baked to a crisp. He shut off his gun and Green followed suit.

"Guess we're safe now," he said. "All right, boys, search the ship. Don't let any other cracked heroes get at those magazines."

PRISONERS, many of them wounded and bleeding, appeared on deck, herded by jubilant toughs from the Torgutkluck water front. The Venusians, used to hardships, injuries and danger themselves, wasted little sympathy on the Corp sailors.

"How's the rest of the battle going?"

Green asked when the last organized resistance on board was broken.

"Damned if I know," Brand answered, nursing a just-discovered gash along his right forearm. "I haven't had a chance to look. Take command of this floating citadel, Jack. I'm going back aboard the *Taxpayer*."

Brand's first act was to glance at the televisor screen, and he was relieved at the sight of Vivian's hairy face. The admiral was displaying every tooth in a wide, happy grin."

"How are things, Vivian?" Brand demanded.

"The battle's over, Brand. We took every one of their lumbering battlewagons, not that I'd want the clumsy scows for anything. What's left of their cruiser squadron is streaking for Wallacetown harbor. Even your *Taxpayer* couldn't overhaul them now."

"Is . . . is it all over? Are we safe now?"

Brand turned and saw the delegate from Yakishikiki. The man was quivering like an agitated aspic. In spite of himself, Brand laughed aloud. Fortunately for his career, the other misunderstood.

"Ah, I see we have conquered again," the delegate beamed. "Not, of course, that I had any doubts for a second. I will notify my associates. Will you have the televisor screens synchronized, general? As chairman of the committee, I feel that I should say a few words of appreciation to our gallant warriors."

"Sure," Brand said.

"Ah," the delegate went on, "you really don't realize what this means to me, personally, general. To have taken part in such a glorious victory. Were there many ships sunk?"

TWO DAYS later the liberating expedition hove to off the hundred-kilometer-thick belt of miasmal swamp that encircled Arkgonactl while Vivian's fighting ships probed for an opening to the island. It was, Brand conceded, useless to attempt to force the main channel into Wallacetown harbor. It was too well fortified.

"Looks like we're up against it somewhat," Vivian reported after a week had passed without noticeable progress. "Waters has what's left of the Corp fleet stationed in the open basins in the swamp, where they can concentrate on any of the smaller channels. We could hack our way through them, but they'd shoot hell out of us while we were doing it."

"We've got to do something soon," Brand said. "The men are getting restless. They want either to fight or go home and I don't want to sacrifice them. And that's not all. You've heard about the spaceships?"

"Yeah. The Corp sent them all to Earth—empty."

"And that means only that they're coming back—full."

For several minutes the two sat submerged in thought in the *Arkol Taxpayer's* main saloon. Better than anyone on Venus, they knew what was brewing.

"Well, that's the situation," Brand said finally. "Waters is showing more sense than I gave him credit for. He's conducting a holding action around Arkgonactl and not risking open combat. If he can hold out for another three weeks, or say four, those spaceships will be back with an army corps from Earth—and they'll be regulars this time. This is just what I've feared all along."

"Damn your Arkols, anyway," Vivian snarled. "Why in hell couldn't they have revolted when the rest of us did? They might have helped us get to the island, at least."

"You can't blame them too much, Vivian. After all, most of the wealth of Venus is concentrated on Arkgonactl, and damn near all the business and commerce is centered here. The Arkols

had the most to lose and the least chance of success, with half the Corp army quartered on them. Moreover, most of the population was connected with the Corp, or had close relations with Earth."

"So the rest of Venus has to surrender!"

"Not necessarily."

"No? Don't you realize, Brand, that if the Ark spaceport was closed to Earth, the Earthmen wouldn't have a single place to land, even if they sent a fleet across? Hell, you can't land these big rocketships just anywhere, like our ancestors did their old put-puts."

"I know, Vivian. I know. For God's sake, let me think."

"We haven't time to think, Brand. We've got to attack somewhere, and right away."

"Any ideas?"

"Yes. Look here." Vivian reached up to a panel on the wall and pressed one of a set of buttons. A large-scale relief map of one section of Arkgonactl was immediately projected onto the opposite wall.

"Here's our position now, five kilometers off the mouth of Braynt's Channel. That's the back way into Wallacetown. There's a small battery of mortars up the channel a piece. They'd stop us before we got within range if we tried to force the channel. But a couple of companies of swamp runners could work around the battery and take it."

"It'd give us a foothold in the swamps, anyway," Brand admitted. "And maybe we could move the transports up the channel, then. These ordinary troops are no better in a swamp fight than the Corp soldiers, you know. Otherwise I'd have cut through the swamps long ago. O. K., Vivian, I'll try it after dark."

A FEW minutes after the last pink splash faded from the low-hanging clouds in the west, three transports weighed anchor and moved toward the forbidding edge of the great swamp. Brand was not aboard any of them, having been recalled for a conference with the Council's committee on the *Taxpayer*.

"Of course, General Martel," the thin delegate from Golubhammon said, "we're with you heart and soul. And, as you know, we sympathize with your desire to free your native colony. But—"

"But you Golubs feel you've done your part and you want to go home," Brand exploded. "All right, go. Take your whole damned Golub detachment with you. Captain Dorgan will assign you transports."

"I'm sorry you're taking it this way," the delegate purred, "but you understand. Our men have been hanging around Ark on these cramped transports for nearly two weeks. They're tired and homesick."

"And you want their votes."

"Please, general."

"You want my commission, too?"

"Oh, no," the Yakol councilman put in hurriedly. "Don't even mention such a thing. We have the utmost confidence in your ability. And, after all, there can't be much of a garrison left on Arkgonactl. You will have plenty of men left, even after the Yakol troops return home."

"So the Yakols are homesick, too. Isn't that just too, too bad. Do you expect me to fight the rest of the war singlehanded? Do you want to strip me of all my soldiers?"

"Not at all, general. Not at all," put in the delegate from Hikelungert. "Speaking for the men from my colony, most of them will remain, at least until the burlon season opens. After that, well, they do have to harvest the crops."

"And that will not be for nearly a month yet," Brand figured. "Thank

you, Councilman Crane. You've given me new hope."

He left the saloon hurriedly, before he put his foot in it any further. "Damn fools," he muttered to himself, leaning over the flying bridge rail and watching the hulls of the departing transports fade into the black night.

"Something up, general?" It was the faithful Green, keeping his vigil on the bridge.

"Nothing I didn't expect, Jack," Brand said. He repeated the gist of the conference. "I offered them my commission, too, but they wouldn't take it. You can depend on a politician to avoid responsibility. If we win out here on Arkgonactl, they'll preen themselves and make speeches. If we lose, they'll still make speeches, but they'll be howling for my head."

"We'll win," Green said confidently.

"I hope so," Brand said. "But this is a tough proposition. On the other islands we had co-operation. We were able to land troops and had bases from which to operate. But Ark is practically entirely enemy territory. Even the Venusians, most of them, have sided with the Corp."

"Well, maybe Wright will have luck tonight. If he can make a dent in their ring of defenses, we'll pour through. And we outnumber them."

DAWN found Brand still pacing the open flying bridge, looking constantly to the westward. Television contact with the expedition had ended when the men left the ships and plunged into the swamp.

"Good, Lord, Green!" Brand exclaimed. "They've had time and enough to reach that battery and take it. Wright should have been able to set up a projector in the fort. I can't understand it."

"Vivian's with him, isn't he?"

"No, damn it! He's scouting the coast with his squadron, to make sure we're not jumped. His ships would be useless in there, anyway."

The fleece overhead changed from pink to cherry-red. It was high noon —and still no word from Wright.

"Twelve transports are weighing anchor, sir," an orderly told Brand.

Brand turned. The ships in question were cutting through the fleet, to form into a convoy in the open water to the eastward.

"Twelve of them," Brand repeated to himself. "And carrying four hundred men apiece. That's near five thousand gone. To hell with them, if that's all the good they are."

A moment later his eyes narrowed. Four armed privateers were also getting under way. He raced down the incline to the control bridge and switched on the televisor.

"Calling Captain Tanner," he roared into the screen. "Captain Tanner, answer. General Martel calling."

The screen glowed and a red, embarrassed face appeared.

"What the hell is the idea?"

"I'm sorry, General Martel." Tanner contrived to look even more abashed. "But my men wanted to get home to their jobs. And our delegate assured me it was all right with you. Besides, the delegates were afraid the transports might be attacked by a roving Corp cruiser."

Brand clenched and unclenched his hands. Then he broke into a torrent of profanity that would have called for a duel to the death had the two men been facing each other in person. As it was, Captain Tanner grew apoplectic.

"By Heaven, sir," he stuttered, "you will answer to me for this when we meet. Commander in chief or no commander in chief."

"Cheerfully," Brand retorted. "Why not now, you white-livered coward? Man to man or ship to ship. Come on back now, or stay out of my sight forever."

The screen faded into blankness as Tanner cut the reception. Brand, weak with futile anger, turned to find the majority of his crew grinning encouragement at him. Then an orderly pushed through the ring.

"Two lifeboats coming from the swamp, sir."

Sailors helped a wounded lieutenant out of the first, then, with less tenderness, yanked a pinioned Venusian, clad in the Corp's gold uniform, to the deck.

"We were wiped out, sir," the lieutenant wheezed, blood spurting from a knife wound in his chest. "General Wright and most of the expedition were killed. These traitorous rats"—he spat at the prisoner—"jumped us in the swamp. There must have been thousands of them, besides half a regiment of Corp. The only men who escaped are those with me."

"Thirty-two out of a thousand," Brand whispered. "This is terrible."

"It'll be worse in a week or so," the prisoner sneered.

"What do you know?" Brand snapped at him.

"Wouldn't you like to learn?"

"Sergeant Graham," Brand barked at a noncom beside him. "Break out a container of liquid air. Dip this prisoner's toes in it, one at a time. Then his fingers. Sprinkle a little on his ears. Then begin with his feet."

"Don't! Don't!" the prisoner howled. "I'll talk. It won't make any difference, anyway. You rebels are doomed."

"Talk!" Brand snapped.

"General Waters has sent every spaceship the Corp had to Earth. Over two hundred of them, including those the Corp confiscated. He's been in communication with the C. S. A. government and the home office every minute since . . . since Torgutkluck."

"We know or can guess that."

"Well, President Rutledge has ordered the Nineteenth Army Corps to Venus to put down the rebellion. Congress has taken over Venus from the Corp. It will be administered as conquered territory and the army will rule it."

The *Taxpayer's* crew, as one man, glanced aloft, as though the exhausts of the invading fleet were already streaking the cottony sky. Men looked at each other with unwonted seriousness in the strained silence. Only the wounded lieutenant still smiled. He had died while the prisoner was speaking.

"I'm going below," Brand told his chief officer. "Communicate with the rest of the fleet. Have Admiral Vivian and Captain Dorgan report to me at once. And call a council of war for three o'clock."

TO BE CONCLUDED.

ISOTOPE 235

By Arthur McCann

SINCE last January, when the uranium fission reaction was first announced, progress toward the solution to the problem of practicable, commercial atomic power has been so rapid that only weekly bulletins could report the succeeding waves of advance.

Now, apparently, this advance has been halted by a problem of familiar type, but one of immense technical difficulty. Not the atomic physicist, but the physical chemist must make the next step—the isolation of uranium isotope 235—technically, U^{235}.

Uranium atoms—any uranium atom—which absorbs a neutron into its nucleus is rendered unstable, with a resultant explosion of intra-atomic energy of inconceivable violence. Some 200,000,000 electron volts of energy are released in the form of "huge" atomic fragments exploding outward with enormous velocities and energies. These atomic fragments, huge in the atomic sense, are themselves innately unstable. They contain protons and neutrons enough to make whole atomic nuclei of such heavy elements as barium, caesium, tellurium and the like. But they contain more than enough neutrons for such nuclei, and almost instantly undergo secondary violent explosions, throwing out neutrons.

Obviously, the process would be self-perpetuating!

Sadly, it isn't—not in ordinary uranium. Any uranium atom which absorbs a neutron will undergo the fission. But—the neutrons produced in the reaction have velocities too low to break into the nucleus of the uranium isotope 238—U^{238}. The lighter isotope of uranium, of atomic weight 235, however, readily accepts even very slow neutrons, neutrons moving with velocities that correspond with the normal velocities free neutrons have due to ordinary room-temperature heat movements. U^{235} would, we have every reason to believe, act precisely as we want for an enormously energetic atomic fuel. U^{238}, because it will not absorb the neutrons produced by its disintegration products, cannot maintain the atomic flame.

Unfortunately, U^{238} constitutes about 99.9% of ordinary uranium. Less than one atom in 1,000 is the activatable U^{235} type.

To present knowledge, the problem is reduced from one of the "secret of atomic power" to the purely physical-chemical problem of concentrating isotope U^{235} in uranium. The odds of 1,000 to 1 do not seem too steep; heavy-hydrogen occurs in normal water in about 1 part in 3,000 of normal hydrogen—yet that can be concentrated to better than 90% purity.

Three main methods are available for separating one atomic isotope from another. The common method of separating the heavy and light hydrogen is by electrolysis, depending on the fact that the heavy isotope, H^2, does not come out in the electrolysis of water quite as readily as the lighter, normal H^1. Commercial plants breaking water down into hydrogen and oxygen have been electrolyzing water for years, feeding water into the great cells, breaking it down, and feeding in more water continuously. Years of this led to a gradual, very slow, concentration of the less easily electrolyzed H^2 in the residues.

Working with such commercial residues—the existence of this ready-prepared "by-product" concentrate made

the obtaining of heavy hydrogen far easier—the separation was not too difficult. Because H^2 is twice as heavy as H^1. There is a difference of 100%.

Even the heavy isotope of oxygen could be obtained from these residue waters for the same gradual concentration through years of continuous feeding had similarly, but far more slowly, built up the heavy-oxygen concentration in the water. It was slower, because the difference here was much smaller—0^{16} against 0^{18}.

Another, basically different method of separation is the method of diffusion. When Argon was first discovered in the atmosphere, one of the methods of separating it from the nitrogen of the air—after the oxygen and water vapor and CO_2 had been removed—was to pass the mixed nitrogen and argon through clay pipestems leading through a vacuum chamber. There was some leakage of the gases through the pores of the clay. The nitrogen molecules, being two nitrogen atoms, had a weight of 28 units; the argon atom weighed 40. The nitrogen leaked somewhat more rapidly, so that, by many recirculations, this differential leakage slowly freed the argon of nitrogen.

But, of course, the smaller the difference, the more recirculations will be required—and the heavier the atoms worked with, the more slowly the diffusion, and hence the separation, takes place, anyway. In separating uranium isotopes, we would first have to convert the uranium into some gaseous compound—since the diffusion works only on gases. We would get a gaseous compound not less than 15 times heavier than air, and far slower in diffusing. And our difference for separation is 3 parts in 240 or so at optimum; actually, since the uranium must be in a compound with other atoms, the gas would have a still higher molar weight, so that the difference would be just about 1%.

But there is one method of separation that is known and used in special instances. It is a method which will accurately and sharply separate even such close pairs as U^{235} and U^{238} with one running. A mass of the element put through the mass spectrograph could be passed through but once, and separated cleanly into the two isotopes as neatly as a cream separator distinguishes heavy whipping cream and skim milk.

The mass spectrograph works on the following principle: If an atom be ionized, given an electric charge by stripping off one of the outer electrons, it can readily be accelerated in a vacuum tube. A charged particle, moving through a magnetic field, is deflected aside into a curved path. The radius of this curve depends on the strength of the magnetic field—which can be made constant, and so forgotten as a variable—and the quantity of the electric charge and the accelerating voltage across the tube—which are pretty readily made the same for each atom, and similarly forgotten as variables—and, finally, the *mass* of the atom.

If one were designed with a very powerful magnetic field and a comparatively low accelerating voltage—so the magnetic field had plenty of time to work on the ions—a wide separation of even U^{235} and U^{238} could be obtained. If a slit were placed at the point where the U^{235} ions landed, they could be collected, led away, and kept as 99.99+% pure U^{235} without much trouble.

Except—that full-blast operation of such a mass spectrograph for a full day would yield about enough actual mass to register on a super-sensitive chemical balance. A stream of ions has existence as something recognizable and different from the surrounding space only when compared with the hard vacuum of the mass-spectrograph tube. A heavy stream of ions is considerably less dense than the vacuum in the ordinary vacuum thermos bottle.

SPACE WAR

Suggesting that rays, ray screens, and all super-potent weapons of science-fiction aren't half as deadly as a weapon we already have!

By Willy Ley

Illustrated by Willy Ley

ABOUT ten years ago, Professor Hermann Oberth, the famous rocket expert, made an interesting experiment which, although having to do with rockets, required neither laboratory nor proving ground. It was a legal experiment. Professor Oberth submitted to the German Patent Office a complete description, with drawings, of a "Space Rocket." It was, virtually, a spaceship with all the details he had been able to think of in many years of study.

After the usual acknowledgment, there was complete silence for some time. Then one day a bulky letter arrived from the patent office, containing the expected rejection. But it was more than just a rejection. Patent offices do not reject things without explaining why. And the staff of the patent office did explain. They had pried the plans apart and patiently and expertly examined every part of them. And after really tremendous research and labor they had arrived at the conclusion that Professor Oberth's plans could not be patented because every part and device was known to engineering science and had been patented before in some country by somebody else.*

The decision, or rather the explanation given, was in a way more valuable than the granting of a patent would have been. It proved that spaceships are not so far beyond the horizon as most people think—the very conservative and very careful staff of a patent office had found that they existed already—only in parts scattered all over and throughout civilization. Periscopes, air purifiers, airproof hulls, automatic devices and instruments of all kinds, water regenerators, et cetera, et cetera—they all exist and not even the much-discussed rocket motors are really novel. Devices very similar to those needed on a tremendous scale for spaceships have already been built on a small scale for gas turbines.

It is, of course, true that, in spite of the decision of the patent-office, spaceships are still to be invented. Every one of the thousand and one parts needs special adaptation, re-designing and re-research. There is still a tremendous amount of work to be done, and much has to be "invented." Point is, however, that there is nothing new in principle that is needed for space travel. It was almost the same story with airplanes forty years ago. Everything needed to build an airplane existed. There was steel tubing and the art of welding it. There were sheet aluminum and rubber. There were wheels and propellers, wings were known and gasoline engines could be bought. The invention of the airplane was delayed because those engines were too weak—it is exactly the same with rocket motors.

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* This decision was entirely in accordance with German patent laws. In other countries a patent might have been granted under the same circumstances.

With more powerful engines came airplanes. And with airplanes came thoughts of military application. At first only observing was contemplated. Even in actual war—1914—airplanes did not combat each other at first. They observed enemy movements, were fired at from the ground and retaliated with primitive bombs. But the pilots of two airplanes meeting in the air are said to have saluted each other—flying alone was dangerous enough. Then one day somebody began to shoot with a pistol and soon planes were having machine-gun combats.

It is only logical to assume that space war will follow the advent of the spaceship as aërial warfare followed in the wake of the airplane. Not from the very outset, probably, because the first spaceships will entail sufficient risk of life in themselves. But later spaceships will have means to combat each other in space and one day somebody will find, or create, a reason to use these means. It is possible, though not any too likely, that mankind will have progressed beyond the use of brute force when space travel has advanced to a fair degree of perfection. And if by then war has already been successfully outlawed, there will be space police and blockade runners. There will be combat, even if not war.

So much for the likeliness of battles in space—even without the famous invasion from an alien solar system. How will these battles be fought? New means of transportation bring new kinds of battle tactics. Roman chariots fought in another manner than the horsemen of Dshingis Khan. Byzantine galleys employed other tactics than Sir Francis Drake, and he had other ideas of naval battle than the commander of the U. S. S. *Washington*.

IN AERIAL BATTLE a new element became important, the maneuverability in three dimensions. It was not the better gun or the faster plane that decided many single engagements, but the Immelmann turn. Evidently space war will develop its own tactics—but tactics depend also to a very great extent on the type of armament in use. That, of course, does not present any question to the science-fiction fan. He knows it by heart from hundreds of stories, the authors of which neither overexerted their imagination nor perceive a need for too much originality. Traditionally spaceships attack each other with heat-ray projectors of incredible temperature and tremendous capacity; they probe into each other's vitals with searing needle rays. They bombard each other's screens with proton guns and barytron blasters. They waste energy in appalling quanities, they do anything but shoot.

To pull the lanyard of a shiny 75-millimeter nickel-steel gun would be too trivial a thing to do. Just about as trivial, in fact, as to picture a race of bearded men in white silk dresses armed

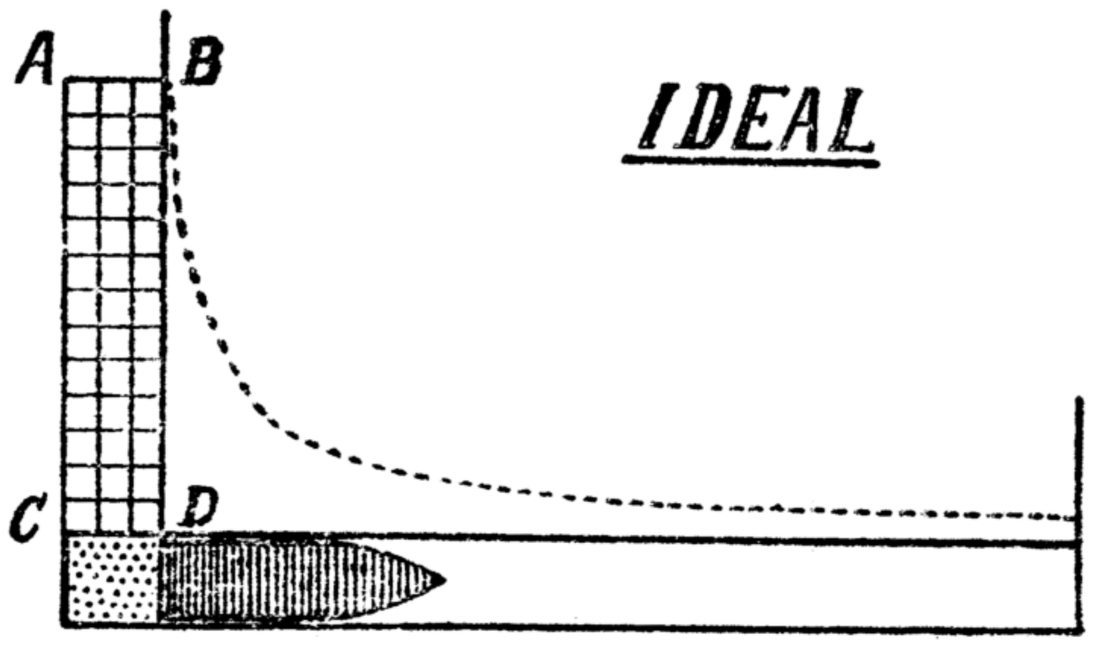

Fig. 1. Pressure curves the barrels of guns.

with crossbows on a planet of Beta Draconis. The beings that live there must be walking octopi, waving heat guns and disintegrator pistols in their tentacles. Normal human-looking people would not be hostile enough to the visitors from Terra, and spaceships with simple guns would certainly be ridiculous and puny. Besides, guns would be to no avail against the ultrarefractory super alloys of the spaceships, and the shells would simply be deflected by force fields.

Well, I still believe that there is no better, more efficient and more deadly weapon for space warfare than an accurate gun with high muzzle velocity. And I believe that an intelligent being from another planet, that is advanced enough to build or at least to understand spaceships, will look like a man—at least to somebody who does not see very well and cannot find his glasses.

Before going into detail about the advantages of guns it is advisable to contemplate the relative merits of ray projectors. That they do not exist now is immaterial; science-fiction is not only concerned with things that are but also with those that might be. How would they look if they did exist? They would consist of two main parts, the mechanism that produces and projects the rays and the power plant that feeds said mechanism.

Power plants are notoriously heavy and, even if we assume atomic power, the power generator will not be just a vest-pocket affair. It would probably need a lot of insulation and a powerful cooling device. We can say with certainty that it would be heavy and bulky. Also, it will probably be sensitive against shaking and jarring, and it would be unpleasant indeed to see all the atomic converters go out of action in the middle of a battle. The ray generator itself would most certainly be sensitive since we have to assume tubes of some kind. And these sensitive ray projectors would have to be in the outer hull of the ship—or even outside the outer hull—so that they do not damage the wrong hull.

So much for the "merits" of ray generators. Now the rays themselves. Even the most powerful and most fantastically destructive ray will need some time to inflict damage. Which implies the need for complicated sighting and focusing devices. How well the rays will focus is another question. Almost invariably the beams will spread out with distance. The farther the target is away the weaker the radiation becomes. The weaker it becomes the longer it has to strike. But holding a ray on a fast-moving distant target, that might be practically invisible with black paint against the background of black space, is no small job.

Besides, those rays are supposed to be more than mere searchlights. They are supposed to have unpleasant destructive qualities, being twelve thousand degrees hot, for example. Naturally the generator has to be able to endure its own heat. But, if there is an insulating material that holds out against the energies released at the giving end, it is hard to understand why the same insulator should not be usable to safeguard the hull of the ship that is being rayed—especially since the energy concentration at the receiving end is only a fraction of that at the giving end.

John W. Campbell evaded all these troublesome questions nicely in his "Mightiest Machine" by introducing the transpon beams. These rays are fairly innocent in themselves, but they have the ability of carrying a large variety and an enormous quantity of vicious radiations originating elsewhere and not touching the projectors. It is possible that something like this might be accomplished one day, but ordinary rays, as they are usually featured in science-fiction stories, have no place in actual future space war. Even if they could be generated they

would not have any practical military value.

A GUN is a much nicer instrument. It is compact and sturdy, cannot be damaged by anything less potent than a direct hit from another gun, and does not require a special power plant. Compared to what one would have to carry around to produce even feeble rays the weight of a gun is small. Besides, a gun is something we do know how to handle. More than six centuries of continuous use have taught us how to take advantage of the fact that certain mixtures of chemicals burn with utmost rapidity and produce large quantities of gases while doing so.

That fact permits three main types of possible application, every one of them in use in ordinary warfare and fit to be used in space war, too. The large volume of gas that is generated suddenly can either be used to destroy its container and whatever happens to be around—that's the principle of the bomb. Or it might be discharged comparatively slowly through a hole in the container so that the recoil moves the container—the principle of the rocket. Finally it might be discharged suddenly through a tube which is blocked by a solid movable object that is then blown out vehemently at high speed just like a dart from a blow gun —the principle of the firearm. All three, bomb, rocket and gun, were invented in rapid succession soon after the discovery of gunpowder.

The latter was found in China around the year 1200 A. D., certainly not much earlier—the statements of old encyclopedias notwithstanding. Bombs and powder rockets were used for the first

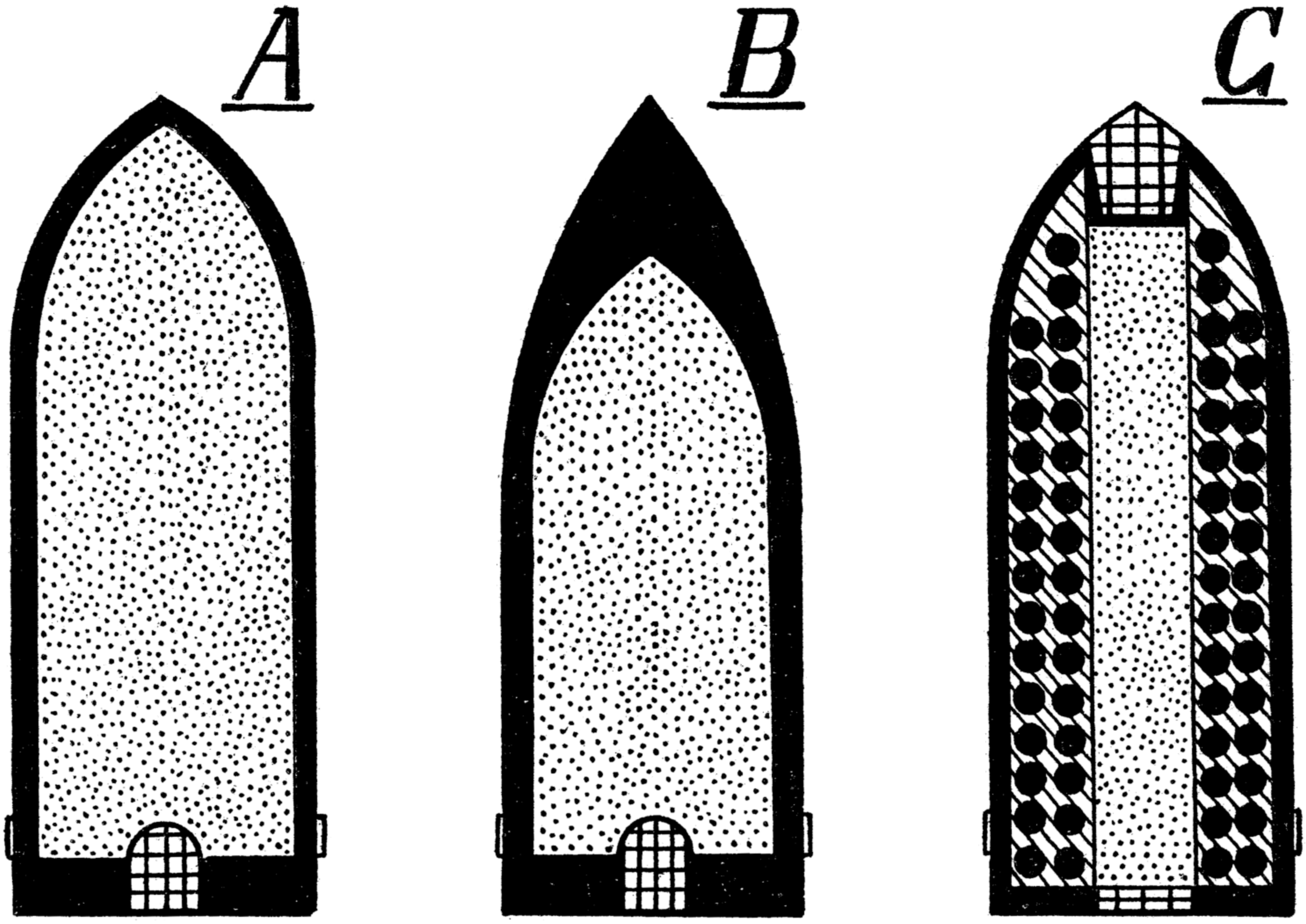

Fig. 2. Three types of explosive shells. Type A is a light, bursting shell, for surface damage. B, heavily cased with armor, is designed to penetrate steel and concrete armor before bursting. C is a sort of "flying machine-gun," a shrapnel shell to scatter hundreds of deadly pellets on bursting.

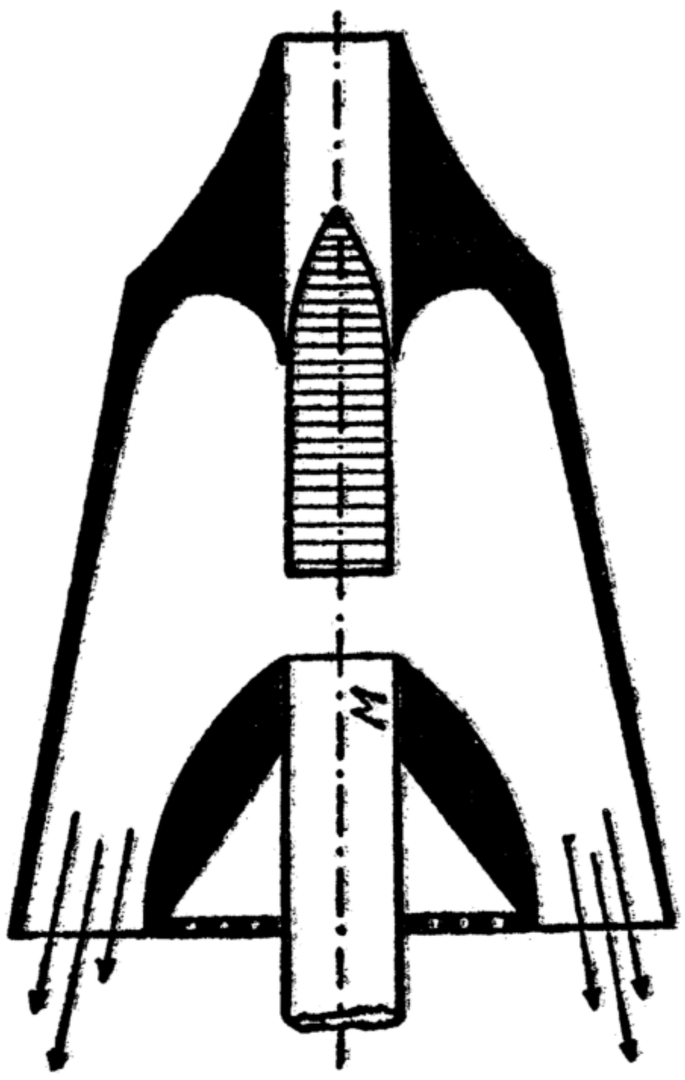

Fig. 3. Antirecoil device for guns. The explosion gasses, turned backward, tend to kick the rifle forward as hard as the bullet's recoil kicks it backward.

time in 1232 during the battle of Pienking. They were then "newly invented." As to guns we think that we even know the exact year of their invention. The *Memoriebook* (chronicle) of the city of Ghent contains under the year 1313 the entry:

"Item, in dit jaer was aldereerst gevonden in Duitschland het gebruik der bussen van eenen mueninck." Translation: "By the way, during this year the use of *bussen* was discovered for the first time by a monk in Germany."

"Bussen" meaning portable guns. The oldest picture of a gun can be found in an Oxford manuscript, *De Officiis Regum,* from the year 1326. Eighty years later guns were known in all civilized countries.

But it took more than four centuries until the *science* of ballistics came into being. A great many other sciences, especially mathematics, had to be developed first before the performance of a gun could be predicted to a certain extent.

Ballistics are extremely complicated, and it is hard to tell whether interior or exterior ballistics present fewer or lesser headaches. The term "exterior ballistics" applies to the movement of the projectile from the moment it leaves the muzzle of the gun until it hits the target. "Interior ballistics," consequently means the movement of the projectile within the gun barrel. The principles are simple in both cases.

The distance reached by a projectile is determined by its muzzle velocity that should be as high as possible and by the angle of elevation where 45 degrees represents the optimum. High muzzle velocity is, therefore, the main goal, and the laws of interior ballistics tell how it can best be attained. There are only a few forces at work. The expanding gases that result from the explosion of the driving charge push the projectile ahead of them, the higher the pressure, the faster. And the longer the barrel the more time to push. Counteracting forces are the inertia of the projectile and its friction against the walls of the barrel. It seems, therefore, that the barrel should be very long and very smooth, the pressure very high and the projectile very light.

Unfortunately it is not quite as simple as becomes apparent if we follow the events in a more detailed form. The shot begins with the ignition of the driving charge. It is here where things look most beautiful. One kilogram of ordinary black gunpowder produces 285 liters of gas at the temperature of zero degrees centigrade, the freezing point of water. One kilogram of TNT develops 592 liters, one kilogram of nitroglycerin 713 liters, and one kilogram of nitro-cellulose powder even 990 liters. Now these volumes are valid for zero degrees centigrade. But the gases are hot, their volume increases by about one third of the zero degree volume for each 100° C. rise. And the temperature of combustion is high, about 2000° C. for black powder, 2600° C. for TNT,

3100° C. for nitroglycerin and 2200° C. for nitro-cellulose powder. There is a limit as to what the barrel can stand and don't forget that it is supposed to have a service life, too. Things are a little easier if the powder burns rapidly but *not* instantaneously; the reason, incidentally, why only a very few known explosives can be used as driving charges. A short moment after complete combustion of the driving charge the internal pressure reaches its highest point, afterward expansion alone works.

THE LENGTH of a barrel is usually expressed not in inches or centimeters, but in calibers, a word which came from the Arab, where it means "model" (standard). Very short stubby mortar barrels are 12-15 calibers long, heavy naval gun 40-50 calibers and infantry rifles even 90 calibers. They are not smooth but "rifled," having a spiral groove which forces the projectiles to spin around their longitudinal axes. Artillery shells fit the barrel loosely—the rifle effect and the gas tight fit are accomplished by copper rings laid around the shell.

We have arrived at the point where the gases drive the shell by their expansion only. The speed of the projectile is still increasing then, but not for very long. The infantry rifle 98, that was and is in use in a number of European armies and has been investigated very thoroughly, may now serve as an example. Its bore is 0.3 inches, the "bullet" weighs 10 grams, the driving charge 3.2 grams. The barrel is 29.1 inches, or about 90 calibers long.

The bullet leaves the muzzle with a velocity of 2936 feet per second, involving a small loss of energy since the muzzle velocity could be 66 feet higher if the barrel were 45-4 inches or 150 calibers long. These figures show how much the friction in the barrel retards the bullet. To attain a speed of 2936 feet per second a barrel length of 90 calibers is required. But an additional length of 60 calibers would increase the muzzle velocity by only 66 feet. No wonder the designers preferred to save these 66 feet, and save weight and material. If the barrel was much longer, the bullet would not leave it. That's what would happen in the case of rifle 98 if the length of the barrel surpassed 23 feet.

In special cases longer barrels were built: The 80-mile gun that fired at Paris from the forest of Crépy in March, 1918,* had a barrel that was 118 feet or 170 calibers long. However, only three quarters of that barrel were rifled, the last 45 calibers of length were smooth. Another retarding factor, not often mentioned and apparently not yet fully determined is the air above the shell in the barrel. Since the projectile acquires supersonic speeds, that air cannot escape but has to be compressed, which might mean a considerable loss in the case of a long gun of large caliber.

Point one in favor of guns in space war: they do not have to spend that energy.

When the projectile leaves the muzzle the trouble really starts. Older books say that the trajectory is a parabola—it is elliptical with the center of the Earth as one of the focal points of the ellipse. The trajectory is influenced by the rotation of the Earth, by the attraction of large mountains, by barometric pressure and by the humidity of the air and by a number of other factors that might be avoided by careful design. Incidentally, streamlining would be useless, we deal with supersonic velocities. While the shell rises the velocity decreases until the peak of the flight is reached. Then the velocity increases again, due to gravitational attraction, and decreases

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*** Usually miscalled "Big Bertha"; the official name was "Kaiser Wilhelm Gun," the common name "Paris Gun." "Big Bertha" was the name of the mobile 17-inch mortar of Krupps. Both guns were designed by Professor Rausenberger.**

with mounting speed due to increasing air resistance.*

The main factors are, therefore, gravity and resistance—two more points in favor of the use of guns in space. There is no air resistance and the gravitational fields are weak where spaceships usually travel.

That bullet from infantry rifle 98 has near its muzzle 3000 foot pounds of kinetic energy. When it hits a target 3280 feet (1 kilometer) from the muzzle its kinetic energy is only 336 foot pounds, and at 2 kilometers a mere 88 foot pounds. The extreme range of that rifle is about 4 kilometers (2.5 miles), but if there were no air it would carry more than 70 kilometers (43.5 miles). Rifles do not attain more than 5% of their vacuum range under normal surface conditions, field artillery pieces attain about 20%, heavy artillery shells about 25%, long naval rifles of large caliber 30%, and long-range guns up to 50%, because the longer part of their trajectory is situated in the near-vacuum of the stratosphere.

In space in a weak gravitational field, the infantry rifle bullet would arrive at a target 20 miles distant—you could hardly aim without a telescope at something farther away—with about 3020 foot pounds of kinetic energy. No, "3020" is not a printing error, because the muzzle velocity would be higher, due to the lack of air resistance in the barrel!

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* Most of these factors become noticeable only in long trajectories. The changes in velocity are beautifully shown in the following table, calculated by Max Valier for the trajectory of the Paris Gun—authentic data are still secret.

angle	distance	altitude	velocity	time
(0)	(km)	(km)	(km/sec)	(sec)
54	0	0	1.5	0
53	3.45	4.67	1.3	4.2
50	10.83	14.00	1.06	14.3
45	19.70	23.72	.93	27.3
40	26.80	30.33	.86	38.2
25	43.07	41.04	.72	62.1
0	63.34	46.20	.65	94.5
25	83.55	41.60	.71	120.0
40	99.06	31.20	.84	150.5
50	115.99	16.60	.95	173.3
53	122.00	6.12	.94	191.0
58	126.00	0	.86	199.0

AFTER being pleased so much with the performance of a portable rifle we'll have a look at "real" guns. There exists an especially nice field piece, *La Soixante-quinze,* the famous French 75 millimeter gun. It has a 20-caliber barrel, about 7 feet 4 inches long. Its shell weighs 14.3 pounds, the muzzle velocity in air is 1970 feet per second, the kinetic energy at the muzzle about 2,800,000 foot pounds.

The barrel of the .75 weighs about 680 pounds, each cartridge about 22 pounds, so that gun, additional equipment and 150 rounds of ammunition amount to about two tons—not excessive a weight for a ship that does not have to carry passengers or cargo—say a Patrol cruiser—but very impressive an armament for a spaceship. Of course, the gun would not be a three-inch *field* piece. In a French paper on *Avions de gros bombardement* it was very recently pointed out that guns are much heavier than necessary.

Designers simply did not pay much attention to weight as long as the gun did not become too heavy for land transport, or if—in case it was too heavy—could be divided into easy loads. Besides, military experts have their ideas about service life. One of my closest friends once designed a new type of compass for a firm working for one of the large European navies. After exhaustive tests that compass was rejected *because it was too light!* It was later redesigned with

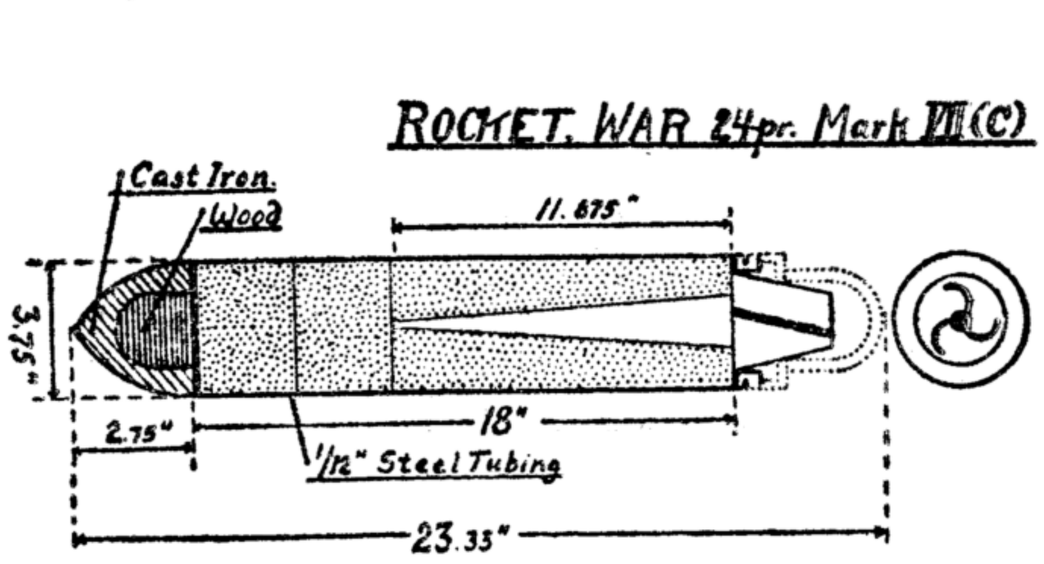

Fig. 4. English war-rocket. This rocket shell is listed in the official British tables of war equipment—a modern, practical rocket shell.

parts and casings that were not stronger than the original parts, but multiplied the weight. The weight of gun barrels, to get back to the topic, could be reduced to about half without visibly shortening of service life and it could be reduced to a quarter if a shorter service life would be accepted. That brings even a six-inch long-range gun within reach for large cruisers that do patrol duty; for example, in circling planets. "Six-inch long range," incidentally, means just that in space, it could shoot at enemies farther away than a portable telescope could show.

So there is certain no need for a special weapon. How about special shells? On Earth three main types are in use: One that dumps as much high explosive as a thin-walled shell will hold on the enemy; one that has to pierce armor and has, therefore, thicker walls and a very strong tip, and one that contains little explosive and many lead balls to scatter around against living targets.

Your first guess is probably that the armor-piercing type is the given projectile for space war. Which raises the question how much armor is to be pierced. Terrestrial field guns are equipped with a shield supposed to protect the gun crew against rifle and machine-gun fire and smaller splinters. Before the World War a shell of 3 millimeters was considered sufficient, but direct rifle fire from distances of a thousand feet or less penetrated them.

Light battle cruisers on the seas carry a six-inch armor around; it would afford protection against hits from fairly distant 75 mm. guns. However, a six-inch armor is considered light; most warships carry ten-inch armor plate, and the heaviest battle wagons show up to 30 inches of armor. Now a battleship has only an armor *belt,* protecting the sides where hits are most likely, and protecting those spots where hits would be most destructive. A large section of the ship is protected by the water in which it

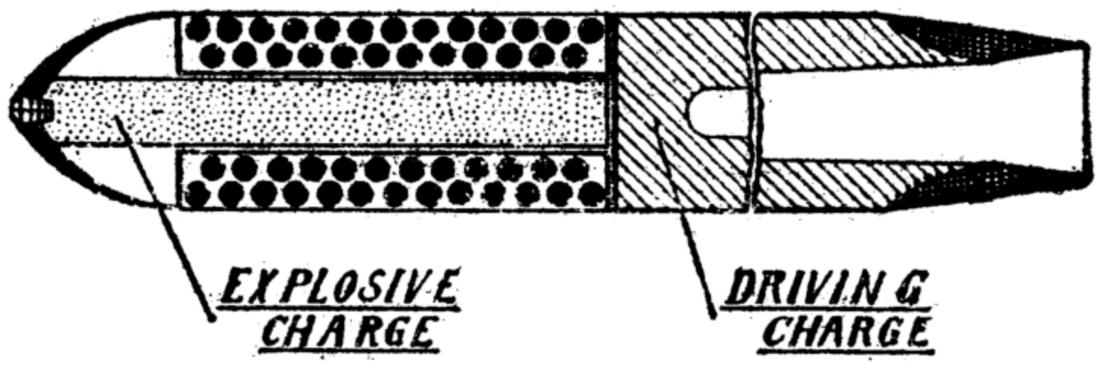

Fig. 5. Cross-section of proposed space rocket shell. To get striking power in a rocket equivalent to a 75 shell, the driving charge of the rocket would be inordinately heavy.

floats. Spaceships are not so lucky as to have vulnerable *points;* they are vulnerable all around. Therefore, they need armor plate all over the hull.

The weight of such an armor is a nice example for mathematical enjoyment at breakfast or during a subway ride. We'll say that a fair-sized spaceship is 90 yards long and 20 yards in diameter. To make matters easier we shall assume that the shape is cylindrical, to make up for the difference in surface between cylinder and cigar shape we'll forget about top and bottom of of the cylinder and restrict ourselves to the curved surface. That surface is equal to the length of the cylinder, multiplied by the diameter, times pi which makes 5670 square yards. One square yard of six-inch armor plate weighs not quite a ton. Multiplied by the number of square yards we arrive at, roughly, twelve million pounds!

You can cut down for the thickness of the armor as much as you want. It will always be too heavy, until you arrive at plates of a thickness the outer hull would have to have anyhow.

In short, a spaceship cannot be protected by plate armor. Its only defense is its offensive power, since it can always carry guns hundreds of times as powerful as the heaviest possible armor. So we don't need armor piercing projectiles, any projectile will penetrate the hull—even rifle bullets.

The important difference is that a spaceship cannot be sunk either—a fact not stressed enough by science-fiction authors. When a battleship gets a few

really serious holes, it is soon out of action and it is relatively unimportant whether the crew abandons ship or sinks with it firing as long as they are above water. A few bad hits that struck a spaceship may disable it as a means of transportation, but it still does not disappear. If every man wears a spacesuit the loss of air can be temporarily disregarded. The various gun posts can and will continue firing until *every man on board* is disabled.*

Space war, therefore, calls for shells that either blast the enemy to *small* pieces at once or for shells that quickly disable every man on board. Which means that either high-explosive shells with thin walls and much H-E are used, or else those shells that contain large numbers of individual bullets should be steel balls and not lead balls, as in terrestrial warfare. If the range is short—as "short" ranges in space go—machine guns are not bad at all, or else that nice contraption that goes under the name of "Chicago Piano," consisting of eight one-pounder rapid-fire guns mounted on one beam, each firing 200 rounds per minute. If a spaceship were subjected to the concert of a *Chicago Piano* for only one minute it would certainly look even worse than after a treatment with heat and disintegrator rays, especially since those rays are usually blocked in stories by adequate screens.

THOSE screens deserve a short discussion, too. As far as ray screens against hostile rays are concerned, we do not need to worry for long. Without effective rays there is no need for ray screens. But it is another story with those fictive screens that are supposed to offer protection against flying pieces of matter charged with kinetic energy. Could those force fields, or meteorite deflectors, or whatever you like to call them be made to actually protect a spaceship? Strong electric or magnetic fields can deflect material bodies, but the influence is much too weak to avail against bullets with supersonic speeds. To create a field of such power and range would require equipment of such a ponderous mass and weight—even assuming atomic power—that nickel-steel armor might be lighter. Only gravity screens would really afford protection.

A gravity screen is supposed to set up a difference in gravity potential and to create what might be called a gravity shadow. A projectile that were to enter a gravity shadow would need as much kinetic energy as is normally required to overcome the difference of gravity potential in question. Since it is also usually assumed that the power of gravity screens can be made to vary, the commander of the ship could "adjust" his screens according to enemy fire.

The trouble with gravity screens is not that we do not know how to make them, but that they cannot be made at all. Devices that "shield off" gravity belong to the category of "permanent impossibilities," things that cannot be done just as you cannot construct a seven-cornered polygon or trisect a given angle. The problem of the gravity screen has to be regarded as having been solved just as the problem of the *perpetuum mobile* has been solved: negatively, it cannot be done.

All this applies, however, only to "gravity screens" of the *cavorite* type and similar marvelous compounds. It does not hold true for what may be termed a "counter field." Unfortunately we do not know what gravity really is—but it is certainly a force of some kind. If, one day, somebody discovers the truth about gravity he might also find a way to create gravity fields artificially. Now we can conceive of a magnetic field that could eliminate the influence of Earth's field if the latter were mag-

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*** I recall only one story where this point was stressed, Campbell's "Mightiest Machine." The fact is also hinted at in Dr. E. E. Smith's "Skylark III" during the first encounter with the Fenachrome, but it is not especially emphasized.**

netic instead of gravitational. (I am *not* speaking about Earth's real magnetic field.)

Similarly we can conceive of a counter field eliminating the effects of the natural gravity fields. To build up a field of the required strength needs lots of power, to be sure, but one might assume that the initial supply could be furnished by a stationary power plant. Such a counter field would, of course, have most of the features of *cavorite*—among them the protection against projectiles of less kinetic energy than the difference of gravity potentials in question.

With this vague hope for possible protection of spaceships we may safely return to the original topic: means of destruction. Guns and machine guns were found to do nicely—and rocket shells?

Rockets began as weapons of war, they were revived for this purpose by Sir William Congreve in 1804 when there was no other competition for them than smooth-barreled guns of tremendous weight that carried a mile without any accuracy worth mentioning. In fact, Congreve's rockets and Hale's later stickless rockets were more accurate than the contemporary guns; hard to believe, but stated in many of the old reports on rocket tests.

And, contrary to popular belief, war rockets were retained in the Service by Great Britain even in the beginning of the twentieth century. The *"Treatise on Ammunition,"* issued in 1905 by the (British) War Office, still stated: "Rockets *are* employed in the service for signaling, for display, *as weapons of war*, and in conjunction with the life-saving apparatus." The war rocket officially termed, "Rocket, War, 24-pr., Mark VII, (C), painted red," was described as being made of steel tubing and cast iron. The average range given was 1800 yards, they had no guiding stick but a device to make them rotate in flight. If these rockets were still used in 1905 or later, they were probably used in colonial service. Despite very many attempts made just at that time to revive war rockets, no army introduced them. Rocket shells behaved, in all the tests that were made, even more erratically in the air than ordinary shells.

It would be different in space. No air resistance would disturb the flight of a rocket-driven shell. And instead of a heavy steel barrel only a thin-walled launched tube would be needed that could even be made of aluminum or magnesium alloys.

The first military objection against rocket shells would be that they could be more easily seen. This, however, could be overcome in using a very high acceleration with short burning period. The driving charge, incidentally, should be powder, not liquids. Powder is not as powerful and not as adaptable as liquid fuel, to be sure, but easier to handle and less expensive because it eliminates the need for mechanisms like combustion chambers, injection nozzles, pressure devices and a host of valves. Powder has the further advantage of having a natural tendency for shorter combustion periods and higher accelerations.

But guns are still superior, this time because of lesser weight!

If the shell part of the rocket shell shall be the same as that of a 75 mm. gun, and if the final velocity of the rocket shell, after complete combustion of the driving charge, shall be equal to that of a gun projectile the comparison of weights looks as follows:

GUN:		
weight of the gun	880	pounds
100 cartridges	2200	"
	3080	pounds
ROCKETS:		
launching tube, etc.	45	pounds
100 shell heads	1430	"
100 rockets with sufficient driving charge	4300	"
	5775	pounds

This, of course, does not mean that rocket shells will not be built. For patrol cruisers guns are better, but other ships will not carry 100 rounds of ammunition all the time, as soon as less than twenty rounds are carried, the rockets are lighter. (There are a few story plots hidden in this statement.) One might conceive of heavy space torpedoes built along the lines of rocket shells, 10 feet long and weighing 1½ tons. But I simply won't like so much powder in one piece on board—and the construction of such a torpedo with present-day methods of manufacture is, by the way, impossible.

SPACE WAR certainly has its peculiar features, quite different from those pictured in stories, but peculiar just the same. The story picture of shining ships that battle with searing rays and flaming screens is so highly improbable that it can simply be termed wrong. There won't be any rays and there won't be screens, especially not the latter because you would be unable to shoot while you had them working.

Instead there would be ships painted night-black, the camouflage of space, carrying guns of incredible range and immensely destructive power. The ships would be extremely vulnerable, but at the same time they could not sink and would be capable of inflicting fatal damage as long as a soul on board is alive.

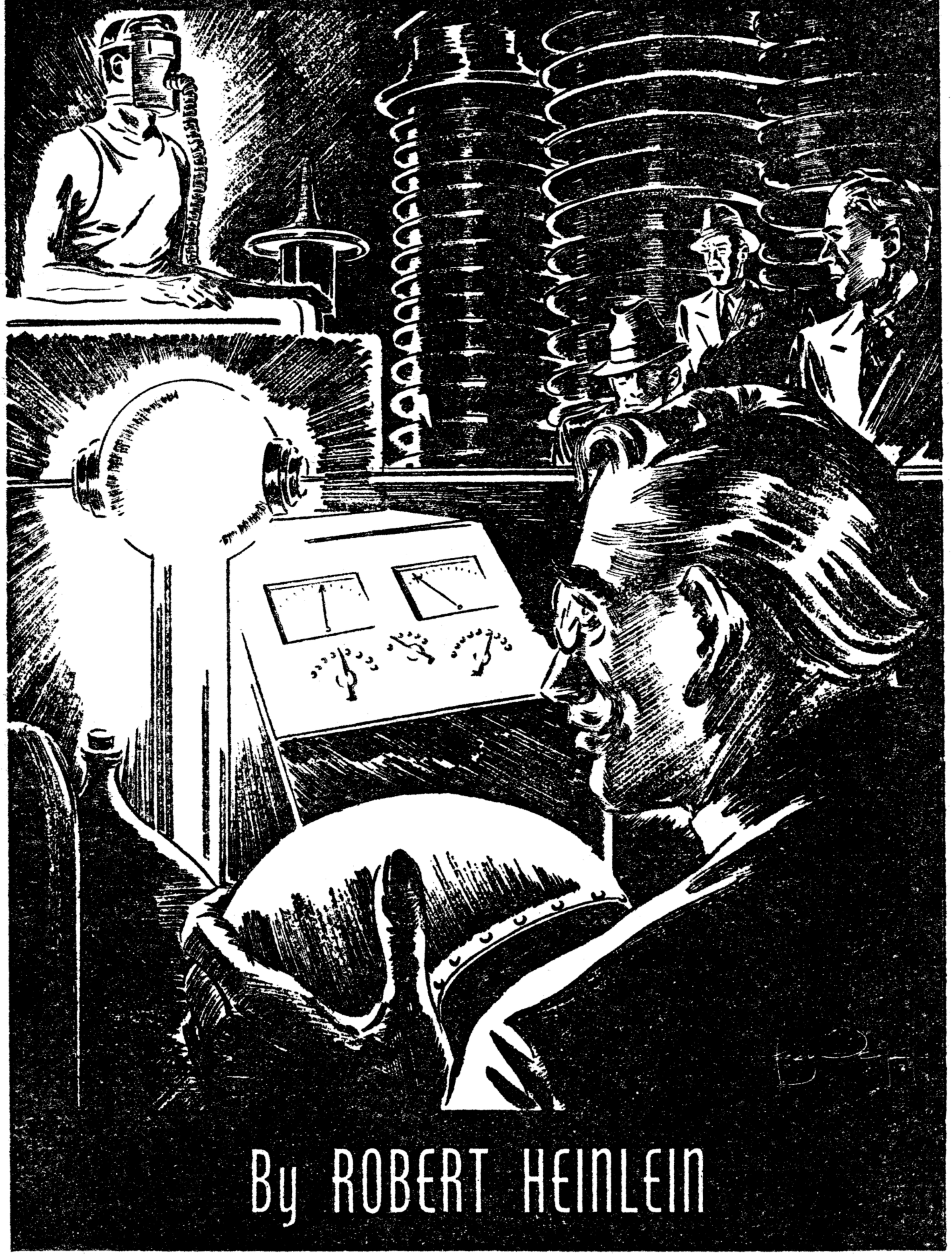
They would not steam into battle with flying colors, but try to approach unseen with all lights extinguished, avoiding the light background of the Milky Way. If the battle is finally opened ammunition would be used very sparingly, not only because the supply is limited, but because missing is almost as bad as being hit. The 2000-3000 feet per second of muzzle velocity do not count very much as compared with the orbital speed of the planets and all the shells that missed show up again at the point of battle after one or two or three years when they have completed their full orbit around the Sun.

That their own fire throws them off course is another reason for few shots. Each 75 mm. shell, weighing 14.3 pounds and leaving in space the muzzle with a velocity of say 2300 feet per second, produces a recoil of 1000 pounds. And the powder charge, weighing, say, 6.5 pounds, and leaving the muzzle with approximately 6600 feet per second produces another 1300 pounds of recoil. A single shot would naturally not influence the course of a 3000-ton patrol cruiser very much, but during a prolonged battle there will be deflections to be corrected by the rocket motors.

On second thought I take that back. The guns do not have to have a recoil that influences the ship. Several years ago Schneider in Creuzot (France) announced a recoil eliminator, based on the difference in speed between shell and driving gases. Since the gases are between two and three times as fast as the shell, they overtake it as soon as it clears the muzzle. The Schneider-Creuzot device was intended to catch these gases and to deflect them by 180 degrees so that their recoil counteracts that of the shell. The example of the 75 mm. gun has shown that the gases, weighing only 6.5 pounds, produce theoretically 1300 pounds recoil, because they are about three times as fast as the 14.3-pound shell that produces only 1000 pounds of recoil. If all the gases could be caught and deflected a full 180 degrees, the gun barrel would actually jerk *forward* with each shot. Naturally some of the gas simply follows the shell—but tests have shown that the remaining recoil is very low.

There is one remark I wanted to make all through this article, but up to now I did not have an opportunity to do so. What I wanted to say was that there was no talk of armament in Professor Oberth's patent application.

LIFE-LINE



By ROBERT HEINLEIN

LIFE-LINE

A new author suggests a means of determining the day a man must die—a startlingly plausible method!

By Robert Heinlein

Illustrated by Isip

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 he 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 RheinSmitt 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 discred-

ited, 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 instru-

ments 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. . . .

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 permament, 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 fortuncteller, 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 has 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. Pinero 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." Pinero 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. Pinero 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."

Pinero 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."

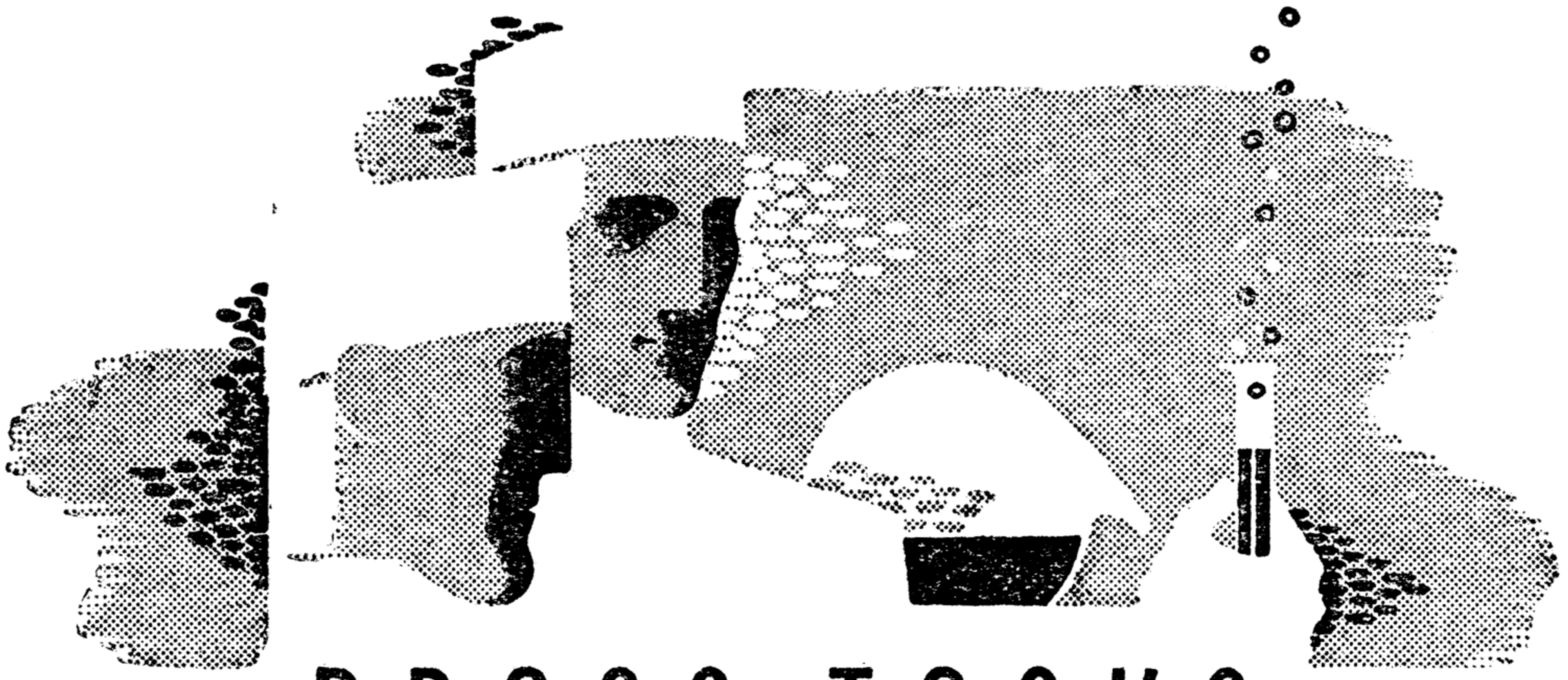
Baird placed both hands over the box. He held the eye of the man opposite him, but did not speak. He licked his lips. The corner of his mouth twitched. His hands shook. Still he did not speak. The man opposite relaxed back into his chair.

"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."



BRASS TACKS

AND SCIENCE DISCUSSIONS

Likes and Dislikes.

Dear Mr. Campbell:

You are old enough in the grand game of science-fiction to remember the uplift you had when you read E. E. Smith's first Skylark story. You remember the drama in your first by Murray Leinster. You probably haven't forgotten the magnitude of J. Schlossel's efforts, nor the brilliance of Jack Williamson. Perhaps you can guess at the pleasure your own scientific precision gave to the readers of the Arcot-Morey series when you beat both Schlossel and Smith at their own games. Do you recall the strength of Gawain Edwards on the pathos of Dahl Juve and the intense suspense of Shachner's and Cloukey's stories?

Perhaps you've noted how they vanish from sight or burn very low as time wears on. One by one they seem to slip away and give place to the Weinbaums and the Barnses and the Binders.

Except one!

Your "Crucible of Power," by Jack Williamson, has everything that J. W. ever had to offer, plus a most amazing novelty, a sort of fresh oldness that defies any attempt of mine to describe it. After two or three years of quiescence he comes forward with the kind of story that makes science-fiction once more interesting. I thank you and him.

I do not mean to belittle Kummer, nor Ernst, nor Gallun—the man who never wrote a poor story—nor Simak, nor Schachner. They are all still good, but let them bow to old-timer Williamson, who is still as fresh as Kummer is today, and as grand as Schachner was yesterday.

You have my thanks for your policy of divorcing science-fiction from fantasy. I like to read both, but I have always felt it an imposition when both appeared in the same magazine.

In case you are interested, I am tabulating a few of my preferences as regards details. They are, however, only preference, and you could disregard every one of them without raising my wrath, so long as you continue to print the stories you do.

LIKES	DISLIKES
Artists	
1. Marchioni	1. Dold
2. Wessalowski	
3. Binder	
4. Schneeman	
5. Brown	

LIKES	DISLIKES
Features	
1. Brass Tacks	1. Articles (90% of 'em)
2. Analytical Laboratory	
3. In Times To Come	
Format	
Bookjacket illustrations on serials	B-j illustrations throughout
Covers (especially astronomical)	
Title Page (as is)	
Authors	
Williamson	Rocklynne
Simak	Casey
Wellman	Burks
Smith, E. E.	Cummings
Gallun	Long, Frank Belknap
Kummer	Repp
de Camp	Ley
Binder	Farley
Hubbard	
Stuart	
Leinster	
and six dozen more	

—Benjamin Keller, Concordville, Penna.

He does not know what WPA means!

Dear Mr. Campbell:

I will now proceed to dissect the May issue from cover to cover.

The Front Cover: Nice work, Mr. Gladney. I thought, however, that the bodies glowed with a blue radiance? However, why cavil at such an excellent job? More by Mr. Gladney in the not so very distant future, I hope.

"Coils of Time": Mr. Miller, I am amazed—nay, bitterly disappointed. This story is not a patch on "Sands of Time." Hope these idioms don't stump you. You know, I found myself wondering if Nat Schachner had had a finger in the pie. I think the trouble lies in the fact that the reader was asked to accept so many astonishing things. Terry Donovan becoming two hundred forty-five years of age, the mindless slaves, the "doughnut" city. No! It was too much to swallow at one go. THINK!

"The Day Is Done": I liked this story, but was it science-fiction? It was not up to the high standard of "The Faithful" and "Helen O'Loy," but still it passed muster.

"Special Flight": To my mind just another spaceship story. I shall probably be sneered at

loudly for this statement by ardent fans who wail they can't get enough of this type.

"Employment": Interesting, and an idea that hasn't been used before. Could you call it a mutant? Nice style of writing, too.

"Melody And Moons": Kent Casey undoubtedly improves more and more. Private Kelton is becoming one of science-fiction's star performers. I prefer him to John West and Dr. von Thiel. Idea, Mr. Casey, combine them all in a story. It should be good.

I haven't read the article, so can make no comment except to ask what does W. P. A. stand for. I noticed this expression was used in "Rope Trick." Quite a good tale, incidentally.

"One Against The Legion": This tale is unfolding really well. There is more of a problem in this than previous tales by Williamson. Williamson is one of my favorite authors. I still consider that the "Legion of Space" will take some beating. I want parts two and four of this. Is there any chance of getting my hooks on copies. What a hope! WHAT A HOPE!

A few more wants: Frank Kelly, Murray Leinster, Eric Frank Russell, a cover by Dold, Marchioni back again, and Dr. Clark. I liked his heroes, Carter and Poggenpohl. Quite a modest little list, isn't it?

Ed, you said we should be seeing covers by a new man. A man used to portraying machinery of today. Well, where is he? Was it Frew?

How about another Past, Present and Future yarn? Only tales by Schachner I liked. I forgot the back cover. I like Chesterfield ads—I. Faux, 3, Branksome Ave., Birmingham 21, England.

Clevelanders: Please note.

Dear Mr. Campbell:

For many years I have been waiting for the inimitable P. Schuyler Miller to return to the science-fiction field with the fatted calf. He sure tasted good. In my opinion, "Coils of Time" has not been equaled in six months' publication of Astounding Stories.

Here in Cleveland an attempt is being effected to organize a science-fiction club. Clevelanders, and those in the vicinity, are cordially invited to contact the undersigned to discuss the matter further.

I clamor for—more of P. S. Miller—Allen R. Baker, 3562 East 140th Street, Cleveland, Ohio.

Stuart's taking a last fling in UNKNOWN, October issue.

Dear Mr. Campbell:

I think this is the first time I ever wrote a letter to a magazine editor, but I saw an inconspicuous little notice in the Brass Tacks which I considered so serious that I could no longer hold my peace. I read my first copy of Astounding early in 1937, and I have not missed a single issue since then. In spite of the pulp paper, it is by far the best fiction magazine I know. The best author you have is Don Stuart. I look forward to his two stories every year, and I will be extremely disappointed if he quits, as you indicated in the notice to which I referred. In fact, if it had not been for his story, "Forgetfulness," I might never have become addicted to science-fiction. Don't let him escape! It would be Astounding's irreparable loss.

The next thing I have to say is to compliment L. Sprague de Camp on his "Design for Life." It is one of the best you ever published. His fiction is good, but his articles are superlative.

Now, I cannot refrain from giving hell to some of your writers. I would like to take W. van Lorne and put him in my vibration machine for a week. (This is constructed from the engine of an old Chevrolet, and is used in my radio and sound lab. to shake auto radio and sound equipment apart, if possible.) If there is anything left of him after that, I doubt whether he will continue to write lousy vibrational junk. Don't print any further stories by E. E. Smith. The "Galactic Patrol" was not sufficiently well written to go down in history beside Tarzan, Buck Rogers, Paul Bunyan, Hari Janos, Beowulf, King Arthur, or even the Lone Ranger. Smith would do much better to change the name of Kennison (?) to another Street & Smith hero and take a job as ghost writer for Kenneth Robeson. Schachner and Burks are almost as bad, but they show signs of improvement.

In regard to sequels: There have been three recently, and all of them excellent. Fortunately, I had read "Out of Night" and "The Sands of Time" and remembered them perfectly. I have not read "The Cometeers," and have no idea where to find it. Therefore I suggest that you make it a policy to give the date of the original story when sequels are printed in future.

Which reminds me of Jack Williamson. He is a fine writer, and packs more action and excitement into his stories than anyone else. I always remember his stories.

My worst gripe is any story which contains the following passage: "Dr. Blikstaagt fools around for a while in the lab, and pretty soon he makes a machine with a mess of gas meters and more radio tubes than Dorr has in his radio junkyard. Now, I am a ignorant guy, and the doc can't make me savvy, so don't ask me how in hell the damn thing works—" This ruse is just too obvious, and it has been worked to death. I think an author should know enough to explain his machines, if the story calls for an explanation.

A few more stories that warrant special mention: "The Incorrigible"; Johnny Black is the best reasoning animal yet. "Cosmic Engineers"; Simak handles the colossal with ease and realism. "Nothing Happens on the Moon"; totally and amusingly crazy. "Shadow of the Veil": interesting because it defies the psychology of story telling—that the reader's sympathy must be with the human, or most nearly human, character. Gallun is good. I think he wrote "Seeds of the Dusk." Kent Casey in general; I am a pacifist, and I don't like the army, but his are very amusing. "The Cache"; very well done. I like scientifically sound plots.

The April Saturn cover makes the best general effect of any I have seen. I hope there will be more like it. The March cover was an extremely poor illustration for a great story like "The Cloak of Aesir." Does Aesir refer to the Norse gods? If so, what is the connection?

I almost forgot "The Day Is Done." A new idea, very well expressed.—Roger Dorr, Palos Verdes Estates, Calif.

See the Drew letter in Science Discussions.

Dear Editor:

I have just finished reading the June issue of Astounding. It has some very good stories in it this time.

Cover—I still don't like it very much. It looks O. K. for a love-story magazine.

"Hermit of Mars"—Fair story. Too much plot for such a short story, however. Characterization was good.

"The Morons"—Quite good. A new and unique idea for science-fiction.

"Done in Oil"—Not as good as the other stories of this series. Was it supposed to be funny?

"When the Future Dies"—A perfectly obvious ending to the plot—which made it a good story. The hero-saving business is overworked. Under the conditions described, the ending was exactly as it would happen in reality. I like the story because it fulfills a need in stf, of reality in endings.

"Pressure"—Poorest one in issue. Could not get interested in it at all.

"Design for Life"—Best in the issue. A good article ending some of the queer beings that writers use. The two articles, in the main, are *very* accurate, and on only one or two points do

I disagree with his science. Congratulate de Camp for me for them.

"Pandora's Icebox"—A good *general* article on the low-temperature research. An error on page 122, top. Viscosity—resistance to stirring, O. K. for a crude definition, but *not* to leaking through holes, that is surface tension, and the two have not been successfully linked together as yet.

"One Against the Legion"—Very good. I disliked only one minor point—too abrupt an ending. I wanted to see the Legion eat dirt for a change, publicly. Now all the readers must howl for another in the series—register my first cry.

Inside illustrations—fair. General make-up fair. As a whole, the magazine rated O. K.—Thos. Gardner, 903 John Jay Hall, Columbia University, New York, N. Y.

You'll like our future covers better!

Dear Mr. Campbell:

This month's Astounding was a very definite improvement over the last three or four issues. Of course, it's not really up to your regular standard, but it does show that the slump, in quality, was only a temporary matter. For a while, though, I was fearful of Astounding's future, what with stories, drawings, and format all collaborating in a nose-shattering dive.

As usual, Simak turns in an A-1 performance with his "Hermit of Mars," an enjoyable tale which ordinarily would have taken first place. But Schachner nosed him out. "When the Future Dies" packed a terrific punch at the end—so positively different from the ordinary ending—that he gets the laurel wreath, plum tree, or whatever is in the vogue. And Harl Vincent comes back with a nicely written story (I might interject—an unusual title!) that breezes cleverly along—in spite of the difficult spot in which the hero finds himself.

The greatest weakness now is the art end of Astounding. That I can't stand.

Before I get off the subject, "Design For Life" was the finest science article I've read, and your cover the poorest I've seen! I'm not condemning your work as a flop, nor you as an editor. I understand that you've got more on your hands than is comfortable, and all things considered, have been doing a remarkably good job. Just take it easy on the radical changes and I believe Astounding will be the better for it.—Mark Reinsberg, 3156 Cambridge Avenue, Chicago, Ill.

De Camp had to put in some limits.

Dear Mr. Campbell:

After due consideration and thought, the June Astounding seems the best issue in a long time; if I may be so rash as to say so, the best in several years, in fact. The only story in the issue that is any less than very good is "Done in Oil," and even that is passable. However, Josh McNab is getting tiresome as it is, and when he starts to take up twenty pages, it's going just a wee mite too far.

The cover: I'm not quite reconciled to Gladney. While the work he turns out is excellent as art, at the same time it lacks the fantastic atmosphere so essential. One big objection is that this latest cover doesn't contain anything particularly fantastic; instead, it might be illustrating almost any pulp magazine. Too, the colors are so subdued as to make me complain on that score. The somber shades become tiresome after a while. Something like your feeling after hearing a modern symphonic composition: you'd give anything under the sun for a good solid C major chord. The case is similar here, for one bright dash of red or yellow would make it a lot improved. And in the last place, I like my lines on covers to be fairly distinct. That's the reason Paul almost always meets with my approval. However, I'm looking forward to much anticipation to Finlay's work; get him as much as you can.

Nat Schachner's short is a very good one, reminiscent of the good old days. The gent who was once our hackiest hack is slowly improving in some mysterious manner. Out of his last three yarns, two—this one and "Palooka from Jupiter"—might be classed as very good, and "World's Don't Care" is at least good.

"One Against the Legion" ends excellently. A little poorer than the first two legion yarns, but that's not much worse than very excellent. Williamson is always worth rereading: his characters live, and that's more than most authors even *try* to do. Also, the conclusion of the science article is outstanding. The only main fault I have to find is this: the whole article is based on the premise that the planet on which this intelligent life develops is going to be similar in every way to earth. Now, of course, I realize that this was necessary. If de Camp and Ley had started to speculate on the possible evolutionary forms on other planets, differing from Earth, the thing would have gone on and on without ending. In a way, it's a vicious circle, and the thing goes around in a circle, and seems extremely futile. But with it all, I enjoyed every word of the article.

As for "Hermit of Mars." Well, in a way it was likable, and in a way a little hackneyed. For one thing, the title. If these authors don't soon run out of nouns to place before "of Mars" and use for titles, I don't know what will become of us. Too, the subject was just a wee bit melodramatic. Especially that old familiar business of finding the girl, saving her from death before knowing she was of the weaker sex, and so forth. But there were admirable parts, and the ending had a rather nice touch. Slowly but surely, Simak is rounding out to be one of stf.'s top authors; in fact, he's not far from there now.

Having already mentioned "Done in Oil," "Pressure" comes up next for the blackballing. Not much is to be said about this one. It's a routine problem yarn, and on the whole undistinguished. Could have been a lot worse, of course, but Rocklynne had better try to find another medium of writing. The present one of setting up a problem, and one that's simply insolvable unless you take a few weeks to do some research halfway through the yarn, and working it out is becoming threadbare.

Runs in my mind there was another yarn in this issue, but I haven't my copy near me at the moment, and so will have to let it pass. The letters were all good this time. Clarke is rapidly developing into a Class A Brass Tacker. Try to expand it even more, though.—Harry Warner, Jr., 303 Bryan Place, Hagerstown, Md.

Rogers doing next month's cover—and probably the "Gray Lensman" cover.

Dear Mr. Campbell:

Well, sir, there's no doubt but what you're still in there pitching. All during this year, Astounding has been moving along on a gentle upgrade; and the June issue continues the good work, being even better than the previous one.

The fictional offerings this month are of a substantial nature, and are topped by Harl Vincent's fine story, "The Morons." Only a certain weakness in character drawing kept this from being a real classic; as it is, it ranks third so far this year. It contained a quality of suspense that I enjoy very much in a story. Give it four pies.

"Pressure" also gets four. Makes my skin crawl every time I think of it! A clever, logical idea.

Josh McNab is back with three. But Burks is wasting a splendid character on rather "frothy" tales. Put McNab into a strong plot and it might be the fictional treat of the year.

Simak comes through with an interesting but "so whatish" tale. Give it three pies for its style, if nothing else. Oh, yes; the ending was very neat. Clif should stick to the longer lengths, though.

And Schachner and Williamson bring up the

rear with a brace of two-pie "epics." Just didn't care for them, although not violently. I thought that nowadays time travelers were supposed to go to a future, instead of *the* future. Nat is getting old-fashioned! Messrs. Schachner and Williamson have one common fault: The indiscriminate use of personally manufactured terms in their "scientific" explanations. Both seem determined that no one shall understand them! Perhaps it's just as well.

Both articles were very, very good, with de Camp's somewhat the better—and the best article ever to appear in Astounding. I shall personally attend to any author who violates the principles laid down in it; so all authors take heed. "Pandora's Icebox" is not far behind, either. Offhand, I would judge that Liquid Helium II is very wet stuff! Articles get four pies apiece.

So the issue averages up to 3.25 pies. Humph! Guess this issue *did* come down a trifle, at that, but not by much, so who cares?

The cover: About the worst so far this year, but still good enough. In fact, I recall only *one* cover on a competitive mag that could beat it. But it's really not a very scientifictionalistic cover, don't you know. Let's have covers that are obviously *science-fiction*. I would like to see Rogers and Frew back again soon—the latter's January cover "grew" on me. And by all means, don't forget Brown!

The illustrations: A slight improvement over May. But why so many new illustrators? You used to have the best illustrated mag in the field, but not any more. Schneeman is slipping badly. Wesso is good, though. I *demand* that you bring back Dold! And even Thomson would be an improvement over these new men. Fact is, I have always rather liked Thomson's interior work, although his one cover attempt was horrible to the extreme.

"Future Tense" was a well-expressed editorial.

Brass Tacks and Science Discussions were well-placed this month, but they're getting short again.

Fond wish: That you adopt the slick paper throughout the magazine.

I've already specified my selection of the three best stories of 1938, but two more deserve mention. "Seeds of the Dusk," and "The Master Shall Not Die!" were very close behind. By the way, you'd ought to have enough votes by now to announce the most popular story of 1938. How about it? "Who Goes There?" will win, I bet a metaphorical two-bits.

Just one more thing: The June *Unknown* was a really commendable issue. "Flame Winds" was magnificent, and a capable supporting cast was headed by "The Gnarly Man," "Don't Go Haunting," and "The Hexer"—R. J. J., 239 West State Street, Barberton, Ohio.

SCIENCE DISCUSSIONS

See Editor's Page

Dear Mr. Campbell:

I should appreciate having a chance, through your columns, to address a plea to your science-fiction authors. As for my credentials, for twenty-five years I have made a reasonable success of industrial and scientific research, and for a longer time than that I have read science-fiction, beginning with Jules Verne and H. G. Wells.

The point is—now I am talking to your authors—I am quite unimaginative, and my fondness for that kind of story no doubt reflects that lack in my make-up. If my case were singular it would be unimportant, but I think I do my profession no injustice when I say that boldness of imagination is rare indeed among scientifically trained men. There are good reasons why that should be so, but that is another story.

You boys with the vivid and uninhibited imaginations have it in your power to blaze some new trails for us workaday folks to engineer into broad and practicable roads. That is no new idea, itself. You and your predecessors have long pointed to intra-atomic power, extra-terrestrial travel, control over genetics in plants and animals, and the like. Now what can you do with something a little closer home? What are some of the other unsatisfied human wants and needs?

Queerly enough, the scientific approach has almost invariably been from the other direction; after someone, solely out of his God-given curiosity, has discovered some new fact about nature, people have begun to look around for a practical application of the new fact, and only after years, or decades, does it become evident that the new development satisfies an important human desire. Witness the motor car, the telephone, or the radio. The need was there all the time, unrecognized. My feeling is that we might greatly reduce the time lag between discovery and application if we could only *imagine* what human wants are going to be. I know that in my own field of chemistry and chemical engineering, every year sees the production in the laboratory of thousands of new compounds, each with unique properties; many of them could be produced in carload lots, and would be, if an economic use were known for them. It will be unusual if more than two or three of those new compounds ever move out of the chemical museum.

What goods, within the power of science and technology to bestow, does mankind potentially desire that it doesn't have now? Better and cheaper housing, improved television, cures for cancer and heart disease? But no, you see my imagination is circumscribed by things I am already somewhat familiar with. What about your fiction writers? Can you show me the kind of things a middle-class family of 1960 or 1970 will be buying on the installment plan? Never mind telling me how they work—that 1960 purchaser won't know, or care. But you can bet he will be buying something we could supply long before 1960 if we only had sense enough to imagine it—W. B. van Arsdel, 5524 Conduit Road, Washington, D. C.

It's still remarkable!

Dear Mr. Campbell:

A correction on Mr. Morse's excellent article on liquid helium and super-low temperatures. It was a darned good article, but, like most items of science, subject to correction as later information becomes available.

The ability of helium to leak through minute holes is deceptive. The Liquid Helium II badly tricked investigators who sought to find out how rapidly liquid helium would seep through a membrane—something on the order of an unglazed porcelain or pottery thimble lowered into a bath of Helium II. If unglazed pottery is placed in a water-bath, water will slowly leak through to fill the pottery vessel.

Helium II leaked through, apparently, in a miraculously short time. Appearances deceived. Later investigation shows that Helium II has, actually, an extremely low viscosity, but not as low as first tests seemed to indicate. The first tests went wrong because the creep-power of Helium II is as phenomenally high as the viscosity was thought to be low. In smug defiance of all laws of gravity, Helium II will climb up a surface, over the top edge, and down again until the level of helium inside the test thimble was equal to the level outside. Then the creep one way balanced the equally active creep the other.

The creep-power and viscosity have little relationship, apparently. Ordinary glycerin, a quite viscous liquid, has amazing ability to creep—as many a motorist has found when his supply of radiator antifreeze crawled out of every watertight joint in the cooling system. There are a number of other liquids which display this creep-power to lesser degrees than does Helium II. Some can be placed in a beaker on a desk and,

seemingly, evaporate overnight. They simply crawl out and run away. A shallow, wide dish of glycerin placed on a desk will crawl all over the desk in a surprisingly short time.

If Liquid Helium II were only available, at room temperatures, some remarkable exhibits could be arranged!

Incidentally, another interesting property of liquid hydrogen is its heat-absorbing ability. It takes more heat-energy to warm one pound of liquid hydrogen a given amount than is required to raise the temperature of any other known substance an equal amount. The specific heat of hydrogen is six times that of water—and water is one of the hardest things in the world to heat —Charles Drew, 82 Blagden Street, Boston, Mass.

But would it work to plot a story?

Dear Mr. Campbell:

Not having sufficient background to handle it, nor time to bone up on it for an article, I think the following material might yet be of interest to the Science Discussioneers.

You know the old problem of the man who dropped his hat overboard while rowing upstream, decided to let it go, went another mile upstream, changed his mind, and went back for the hat, with the question how fast was the current? To solve it, you let X equal the speed of the current, and so forth. Quite easy.

Algebra—mathematics in general—makes hard arithmetic easy, makes it easy to handle complex arithmetic argument in equation fashion.

But—how about a question like "Can a man be his own brother? His own half-brother?" There's nothing for "X" to equal in that sort of a thing, and, having no formula to use for a handle, the mind tends to bog down and go in helpless circles.

There is a way, though, of converting such things to mathematical formulas. It's called "the calculus of statement," and is very lovely. You let X represent the relationship known as brotherhood, or half-brotherhood—or whatever relationship you want to work with. There are regularly agreed-upon symbols that represent interaction of the quantities of relationship symbols used. They don't have the multiplication sign x, and the work, while vaguely resembling a series of algebraic equations, actually is quite different on closer inspection.

But the main thing is that a statement can be reduced to a formula that can be handled as easily as an algebraic expression. You can put the statement "Jones is a fraternity brother of Brown and of Robins, but not of Thomas" into a formula as easily as the statement "a man has twice as many nickels as dimes, and half as many quarters as both, and the total value is so much." Further, you can then play with them and interact them as readily as you can a pair of algebraic equations. You can carry out cancelations, simplifications, eliminations, et cetera.

Of what importance to develop a mathematics to determine whether a man can be his own grandson or his own half brother? None—unless it will also do little feats like this: Reduce a 120-page insurance contract, with hundreds of clauses, to formulas that can be readily, immediately grasped. Here we have, let's say, a fifty-page document specifying the responsibilities of an insurance company. Another company offers a sixty-page contract that, they claim, is better. Well, what is the actual difference between them? What does each offer under a given set of circumstances?

Reduce both to this type of logic-mathematics, and get simply a series of equations. And—you know, the chances are pretty good that all of a sudden you'll find that one clause on page 13 contains a phrase that precisely contradicts a phrase of a clause on page 48! In that mass of legal verbiage, the two little phrases slipped by their authors unrecognized; they had to keep too much in mind while they wrote them to remember the details of the whole fifty or sixty-page mass. But not only that; now, suddenly, we can see a hole in the thing you could sail the Queen Mary through!

And, furthermore, since—by the aid of our mathematical reduction—we can sit off and view the whole thing at once, can interact every clause and phrase readily and accurately at will —the thing obviously is fearfully repetitious. We can reduce Contract No. 1 to a twenty-one-page document, and No. 2 to a twenty-two-page affair.

Finally, it becomes evident that, after we've mutually canceled equatable terms in each contract, Contract No. 1 actually offers just as much as No. 2. Which was practically impossible to determine when to do so required complete memory of every clause and phrase of two 100,000-word books.

For the analysis of social, governmental and business affairs, where so much relies on relationships rather than quantities, straight algebra and mathematics are simply inapplicable. The logic-mathematics, the statement-calculus and other, similar branches of the new work, makes the befuddlement in which the lawyer and sociologist and economist live something the human mind can, at last, grasp hold of in a sane and orderly way.

Another useful application is in the design of complex automatic controls. One of the kind where operation A must not take place if the temperature is above X degrees, unless the pressure is also above Z pounds, in which case it should take place, except when the fuel supply is running low. But if the sun has risen, and the day shift will be on within two hours, why then it should take place anyway. That sort of thing makes it hard to keep the control circuits and interacting safety-stops clearly in mind. Add a few alternative operations that should be done when other combinations of those conditions crop up, and you'll really have a headache for the designer of controls.

But—turn those statements, which are really relationships rather than quantities, into statement-calculus formulas, and presto! it's perfectly clear what switches must be used.

And believe me, when someone lays out an automatic-director apparatus for a rocket ship operating in three dimensions, with meteor detectors and safe-acceleration limiters and fuel-supply meters to consider, he's going to use statement-calculus or else!—Arthur McCann, 761 Scotland Road, Orange, N. J.

STOWAWAY

By NELSON S. BOND

STOWAWAY

The stowaway wasn't so bad—but his electricity-drinking pet—!

By Nelson S. Bond

Illustrated by Cartier

WE were two days out of Sun City spaceport when Cap Hawkins—he's skipper of the freight lugger *Andromeda*—came busting into my turret like a pint-sized Ceres cyclone.

"Awright, Sparks!" he snarled. "Awright! Come out with it! What was you doin' last night at six bells? An' why?"

I said: "Who, me? At six bells I was sleeping in my hammock, dreaming about a two-inch steak with all the trimmings. On account of the grub Slops feeds us on this lousy can has given my belly an acute case of nostalgia. Why?"

"Why?" howled the skipper. "Why? Because some low-down son of a space grappler was monkeyin' with the lights, that's why! Me an' Chief McAndrews was havin' a quiet game of draw poker when all of a sudden—*bing!*—an' the lights went out, just like that! By the time I got the emergency carbides goin', damned if that sneakin' little Scot didn't have kings full!"

"He get you for much?" I asked.

"It so happened," replied Hawkins stiffly, "that, at the time, I had four aces up my . . . er . . . *in* my . . . hand. However, that's beside the point. The point is, if *you* wasn't messin' around with the electrical equipment, who was?"

I told him, "Listen, I'm just a radio operator; not a professional esper."

"Espers!" snorted the skipper. "Don't mention them quacks to me!" Like all hard-boiled, practical space hounds, Cap Hawkins looked with scorn on fortune-tellers who claimed to see the future through their use of "extra-sensory perception." "I'm asking a simple question: Who gummed up the ship lighting circuit?"

I suggested: "How about McAndrews himself? Maybe he was trying to get the jump on you in your nightly 'you-cheat-me-and-I'll-cheat-you' game."

"I'll thank you," said the Cap caustically, "not to talk about our friendly little poker games in that sarcastic tone, Sparks. Anyhow, I did susp . . . I mean, I *did* ask McAndrews. An' he was just as surprised as I was. We went down to the engine room for a look-see, an' found that every damn battery in the lighting circuit had gone dead."

"Dead?"

"You heard me."

I scratched my head. I said: "That's funny. There wasn't anything wrong with them when we pulled out of Sun City. I know that, because I looked 'em over for transposition, just in case anything happened to my wire apparatus."

"Well, they're dead now. Flanerty's got 'em on the charger." The skipper looked worried. "Sparks . . . you don't think this could be sabotage?"

"Sabotage?" I snorted. "What the hell for? Nobody would want to sab this broken-down old crate. Would they?" I looked at him curiously. "Are we carrying anything unusual, Cap? Or valuable?"

"Not unless you'd call a hold full of *mekel* root and *clab* beans unusual. We're jammed to the gunwales with fresh Venusian vegetables."

"Then I don't get it at all," I told him. "Except, maybe, that the old tank is finally ready for the junk heap. You want I should report it, Cap?"

Hawkins said hastily: "No. Don't report it, Sparks. It . . . it's probably nothing at all."

WELL, I knew how he felt about it. The corporation had, for a long time now, been thinking of taking the *Andromeda* off the Earth-Venus run. It was an ancient crate, built way back in '84 or '85. It had been removed from the passenger service ten or twelve years ago, by order of the SSCB—Space Safety Control Board—since it was not equipped either with milliamp space deflectors or with the now-standard Moran H-penetrants. We could have used Morans, all right.

Every time we went wallowing through the Heaviside layer, I got a fine case of the bitter-jitters. It's no cinch to sit there staring through bulk *quartzite* at the swirling, electronic storm of ionized gas that comprises the Heaviside blockade, knowing that if your generators should happen to break down for half a second, relaxing their protective field, you'll be blasted into a billion hunks of molecular matter.

But that was one of the hazards of the job. And I had to serve my apprenticeship as radioman on the lugger if I ever wanted to get a post on one of the big luxury liners.

That was the difference between Cap Hawkins and me. I was a young man on the way up. He was an old space bound, just barely hanging on. If the *Andromeda* was removed from its freight run, he'd never get another command. He'd be given a watchman's job on a Lunar outpost, maybe, or made a lightship keeper on one of the planetoids. But what kind of future is that for a man who's spent a lifetime pushing gravs?

So I knew how Cap Hawkins felt about it. He'd never report anything wrong with the *Andromeda* until some day, way out in space, she finally collapsed into a bunch of rivets. All I could do was sympathize with him—and hope that by the time that happened, I'd be on another boat.

I said: "O. K., skipper. As you say, we'll probably find out it was something quite natural. What's the orders? Shall I relay the log?"

"Just tell 'em," he said, "that we're comin' in on schedule. And . . . well, you might ask 'em for a Heaviside reading while you're at it."

"I already did," I said. "Murphy, on Pallas, tells me it's acting up something fierce. It always does, skipper, when Earth's at perihelion."

"Yes, I know," he said. "Well, we'll get through all right, Sparks. See you later."

And he went back to the bridge.

I OPENED the key and contacted Joe Marlowe at Lunar Three. We were still a little too far out to get Earth direct, but we could get through to its satellite. I relayed our log position, declination, and speed; told them we'd be in on schedule.

Joe was feeling playful. I was radioing in English, but he kept shooting Universal back at me. Acknowledging with *"Mercij, amig!"* and such stuff. It made me sore. We aren't allowed to wire profanity through the ether, but I said:

"To you-know-where with that Universal chatter, guy! It's bad enough having to jabber Universal with the Mars-Venus-Asteroid gang without talking it to you, too."

"O. K., Bert," he shot back. "Be seeing you. Watch your can coming through the Heaviside!" Then he

signed off before I got a chance to ask him whether he was insulting the *Andromeda* or just being vulgar.

I spun the bank vernier, then, and picked up a "CQ" call on the nine-band. Plugged in and acknowledged and found it was a space "ham" buzzing interplanetary traffic from his digs on Mercury. I didn't have anything else to do, so I let him talk for a while. He was a miner, and he was lonely. He let down his hair and told me all his troubles; asked how I liked being radioman on a freighter; oh, you know how hams talk to each other.

After a while, I thought I'd better clear away, so I tapped out the Universal code of farewell, *"A vu cajonal-amij!"*—meaning, "Regards to you!"

That is, I started to tap it out. I got as far as *"A vu caj—"* and all of a sudden, *bing!* my sender light went dead on me! The galvanometer sighed, turned over, and went to sleep at zero. I jammed in my audio, quick. I was just in time to hear my "ham" communicant complain, indignantly:

"Hey, what's the big idea of insult—"

Then that went dead, too!

Well, I felt ashamed of myself. The poor miner had no way of knowing my set had gone dead on me. All he knew was that I had abruptly terminated a conversation with the sentence, "Nuts to you!" Which goes to show you what a hell of a language this Universal is.

I put on a pair of rubber mitts, got a screwdriver, and started looking for the disconnect. There wasn't any. I was clean as a pin, inside. So I traced it down through the leads. Still everything was O. K. I finally got down to my storage batteries—and there was the trouble. They were all gone! Dead! Cold as a brace of Lunar slugs.

I said, "Damn!" and scratched my head. It didn't make sense. Batteries don't go dead like that; completely and all of a sudden. I got a flash and crawled down on my hands and knees; looked under the control desk. I saw some darned thing that didn't belong there. Something small and pale and faintly blue; a sort of blotch of shimmering light. I put my hand out to grab it; touched it.

"Ow!" I yelled. Because, rubber gloves and all, I got a jolt of juice up my arm that would have curled the hair of a condenser.

And then there were soft, sliding footsteps behind me. A muffled, apologetic voice said: "Oh! Oh, I'm awfully sorry he bothered you. Can I help?"

I TURNED and stared, my jaw dropping open. It was a Venusian. Not one of our crew, either. A pale little fellow I'd never seen in my life before. His fur was soft and downy as a cat's, and he was making vague little gestures of regret with his paws. I stood up. I said sternly:

"What are you doing in here? How did you get here, anyway? Who are you?"

He shifted nervously from pad to pad. Venusians are always meek little fellows, but this one was even more so than most. His long, furry ears drooped disconsolately. He said:

"I . . . I'm a stowaway. I didn't mean to come out of hiding and disturb anybody. But *he* got hungry and escaped. I had to come out and find him."

"He?" I demanded. "Who?"

"Pogo." He gestured toward the quivering ball under the control desk. "My ampie."

Suddenly everything made sense. An ampie! I knew, now, why the lugger's lighting circuit had gone dead, and why my batteries had collapsed on me. I said: "Why, blast your fuzzy hide, I've a good notion to break your neck. You know ampies aren't allowed on spaceships. What's the idea of—"

I strode to the control board, shot the ship intercommunciations switch, and audioed the skipper's bridge. The cur-

rent hummed, and Cap's face appeared in the visiscope. He said: "Yes, Sparks?"

"Skipper," I yelled, "there's a—"

That's as far as I got. Cap's face faded into darkness. The intercommunications needle rolled over and played doggo. I looked down: That damned little ampie had crawled onto the dry-cell series and now lay curled on the contacts, glistening palely, making contented little sucking noises. I yelled, "Hey!" and started to reach for it.

The Venusian was faster. He said: "Wait. Let me do it!"

He produced, from the rummage bag that all Venusians wear in their girdle, a lead-foiled jar—something like a Leyden jar. He stooped down; made a purring little sound. The ampie stirred sluggishly, uncurled itself from the dry cells and rolled over to him. At his command, it slipped into the container. He screwed the top on. It lay there, a surfeited mist of milky blue, in the Leyden.

"Now, look!" I said ruefully. "Look what you've done. You and your damned pet. Ruined my batteries and the ship's intercommunications system!"

The Venusian wrung his paws regretfully.

"I'm so sorry," he mourned. "*So* sorry. But . . . well, you know how ampies are. They just eat and eat and eat. If they get anywhere near electricity—" He shrugged. "And they're *always* hungry!"

Footsteps pounded up the gangway, and Cap Hawkins busted into the room. He yelled: "Sparks, what's the matter? You went dead on me! What—" Then he stopped, seeing the Venusian. His face turned the color of a Martian sunrise. "Who are you? What are you doin' here?"

"He's a stowaway, Cap," I explained. "And he's got an ampie in that jar. That's where all our juice has been going. Last night and just now."

"A stowaway, huh!" roared Cap. "And an ampie! On my ship!" He grabbed the badly frightened Venusian. "You're goin' to regret this, my fine, furry friend! It's the brig for you. Sparks, call Henderson and tell him—"

"I can't. No juice."

"What's that? Oh, yes. Then I'll take him down myself. Come on, you!"

He started to drag the Venusian, squealing and protesting, toward the door. The little foreigner cried plaintively:

"But, captain . . . I didn't mean any harm. I wanted to get to Earth. I've always heard—"

"Sure, I know. That Earth's pavements are covered with gold, and that the trees there blossom with dollar bills. Well, Earth's overrun with you immigrant planeteers. You go back to Venus on the next cruiser. Meanwhile, you go in the brig here. You and your ampie. Come along!"

And away they went, Cap dragging the Venusian by the scruff of the neck, while the little fellow cuddled his ampie to him desperately.

I GOT to work. I had fresh dry cells in my locker, so I hooked a new series into the intercommunications system and tested them. They worked all right. I junked the ones the ampie had sucked dry. While I'd never actually *seen* an ampie before, I knew what they were and what they could do.

These ampies were the same little pests that made the colonizing of Venus so difficult for the pioneer space hounds. Small creatures of negative energy, with an intelligence of about .03 on the Universal scale; they had one besetting sin. Their insatiable appetite for juice. Put them anywhere near a battery, dry cell or wet, and they'd suck it empty in ten seconds flat. They thrived on amperage—hence their name.

They were but one of the many oddities native to the damp planet. The

Venusians themselves were funny ducks. The course of evolution, on Earth's sister planet, had somewhere or other pulled a boner. Intelligence had arisen not amongst the anthropoids, as on Earth, but amongst the Leporidæ. The present-day Venusian citizens were as far removed from Earth rabbits as men are from—well, say chimpanzees. But bunnylike habits cropped up once in a while, displayed themselves. As in the amazing prolificness of the race. Venusians bred young, early, and often—which was one reason World Council had set up stiff immigration quotas. And then there were the physical characteristics—long, downy ears, pelts of soft fur, oddly formed joints which, though the Venusians walked erect, still looked more capable of leaping than of striding.

I couldn't help wondering what the Old Man would do with our stowaway. I found out shortly. When I went down to mess, the Venusian was helping Slops in the galley, and was serving the crew table.

"So you put him to work?" I said to Cap.

"Why not?" he grunted, shoveling away grub. "I'm not givin' him a free ride to Earth an' back."

"Good idea," I approved. "And the ampie?"

"In its jar," said the skipper grimly, "in the brig. That guy's got a nerve bringin' one of them things on board. Why, if it ever got loose—"

"It can't though, can it?" I asked.

"Not a chance. I—"

Then he stopped abruptly as a roar rose from all the sailors in the mess hall. The lights had suddenly dimmed and gone out!

I reached in my pocket for a mechanical lighter; lit it.

"Not a chance, hey?" I yelled. "Well, it looks like he's gotten out somehow or other!"

Cap yelled: "Hey, you . . . stowaway! Come here!"

The little Venusian came scurrying over. His fuzzy ears were stiff with excitement. "Oh, my!" he was saying. "I do believe Pogo must have—"

"Let's get him!" yelled the skipper. "Let's get him before he sucks every drop of juice out of the ship!"

WE RACED out of the mess hall, down the engine-room companionway, and into McAndrews' sanctum. The chief was on his hands and knees as we got there, searching beneath one of the banks with a flashlight. He heard us approaching, turned and yelled over his shoulder:

"There's an ampie in here! The darned critter just ate up all the lighting juice. Skipper, that's what happened last—"

"I know!" roared Cap Hawkins. "You, Venusian . . . get that thing back in its jar!"

The Venusian stepped forward. Again he knelt down, made that cajoling little sound that called his pet. Again it answered his command, rolled out from beneath the bank—

But one look, and the Venusian rose unsteadily to his feet. We all groaned. He turned frightened eyes to us.

"It . . . it won't go in the jar!" he bleated. "It's too big!"

And was he right! That darned ball of milky blue was twice the size of a bowling sphere!

I yelped: "But how did it get that way?"

"They . . . they grow," explained the Venusian faintly. "When they eat a lot, they—"

McAndrews bellowed: "Well, we've got to do something! Look, I've got a Forenzi condenser here. If we tinfoil it, do you think maybe—"

He started to drag forth the Forenzi. It was a huge, vatlike container of glass with adjustable lid; plenty large enough

to accommodate even the juice-swollen ampie.

The Venusian squealed: "That's fine! That will hold him. Here, Pogo! Come here to papa—"

He got the thing to roll halfway to the Forenzi. I helped McAndrews get the lid ready so we could clamp it shut. But the ampie seemed to sense, at the last moment, the trap that was being prepared for it. It squiggled, a pallid ball of lightning-shot minus energy, to the very lip of the empty vat. Then—

"Come back, Pogo!" wailed the Venusian.

And, "Stop the damn thing!" yelled Cap.

And, "Good Lord!" gasped McAndrews. "Don't let him get into the engine room proper, or—"

But we all jumped too late. Not that we could have done anything to stop that rolling chunk of ball lightning if we'd wanted to. You can't touch a thing like that. It flickered away from us, rolled to the door of the generator room, thinned itself and oozed through the doorway. We heard Hogan, the assistant engineer, yell. Then we burst through the door just in time to see the ever-hungry ampie make a surging dive for the driving batteries—

"Oooh!" moaned Cap Hawkins.

And well he might moan. I've told you how little time it takes an ampie to suck batteries dry. We hadn't taken two steps into the room before we heard the motors splutter, choke, cough weakly. The drive cam ground slowly to a halt. All of the din and clatter of the engine room disappeared suddenly, and the lights on the control board went out.

From the audiphone over the chief's desk we heard a tense voice shouting:

"Chief! Chief McAndrews! What's the matter? Our engines have stopped! We're free-wheeling through space?"

"He's tellin' us!" squalled the skipper. "Look at that thing grow!"

For the ampie, cozily perched over the positives of the battery unit, was really going to town! It was making a meal, and what I mean, it was really making a meal! All we could hear was that crazy, sucking noise as the ampie absorbed current. And as the galvanometer sagged limply, the ampie grew. It got as big as a man, as big as a Jovian, as big as a Venusian mammoth. And it kept on growing. A huge, glistening, milky-blue ball of spark-specked, pulsating energy, it hovered over the draining batteries like a captive blimp; stirring sluggishly, sucking rapturously at its Gargantuan meal.

And from the turret room above came the lieutenant's frantic voice again:

"Chief! Chief McAndrews! Get those batteries going again, for God's sake! We're only forty minutes out of the Heaviside layer!"

BOY, now there was news for you! They say a man who is about to die sees his whole life pass before him in brief panorama. That's the bunk. I saw my *future*—what there was of it—spreading itself before me.

I saw our old lugger zooming along with no motors; piercing the Heaviside layer. I saw that spark-happy sphere of ionized energy swaddling the Earth like a twenty-mile-deep protective blanket. Protective—sometimes! Against the R and Q rays. Against the cosmics and the ultraviolets of the sun. But this time—

Well, the H layer was not protective as far as we were concerned. I'd read, and heard of, and even seen a ship hit that layer with its shields down. In my mind's eye, I could vision the sudden blast of coruscating light that punctured as far as Earth's troposphere. That would be us. And in some observatory below, a languid assistant would drawl: "Well, well. There goes the *Andromeda*. I always knew she'd get it some day!"

Like I've told you, Cap Hawkins was

a hardened old space dog. He didn't panic easily. But his number was just about up this time, and he knew it. He pawed his gray thatch bitterly and said:

"Boys, this is taps! We'll never get through the H layer without our generators buildin' a shield. Even Moran penetrants don't always hold up. And this time of year, the bombardment is at its peak. We're done for!"

McAndrews snapped his fingers. He yelled: "Skipper, we'll abandon ship! We've got a lifeboat with an individual battery set and shield. There are only twenty of us. We'll escape in that!"

"That's the ticket!" roared the captain. "Come on, everybody!" He glared once more at the flickering ball still resting over the now completely drained batteries. "Leave that damn ampie there! I hope it gets blown into a million an' six pieces!"

He started for the companionway. But the tiny Venusian stopped him with a feverish paw. He piped, "Captain—"

"Oh, you, eh? Well, come along! You don't deserve to be saved, but—"

The Venusian said: "It . . . it's not that, captain. I just wanted to tell you there's no use going to the lifeboat. That . . . that's where Pogo and I stowed away. And I . . . I let him eat the juice there to keep from getting hungry!"

Cap Hawkins groaned and wilted. His eyes were those of a haunted man.

"Sparks," he said feebly.

"Yes, skipper?"

"Your sendin' batteries are all right, aren't they?"

"Yes."

"Then"—hollowly—"you might as well go up an' wire Earth. Tell 'em"—he gulped—"tell 'em the *Andromeda* is not comin' in—ever."

I got a brainstorm. I yelled: "Hey, Cap, suppose I tell 'em to send out a rescue ship? We'll hang outside the Heaviside layer until they get here—"

"How?" shrugged Hawkins. "We ain't got no motors. We can't stop. We'll keep movin' at our present rate of acceleration, till—"

He stopped. There was deep silence in the engine room.

Then the Venusian coughed and said: "Captain—"

Hawkins turned a burning eye on him.

"You," he rasped, "shut your bunny-like trap! You got us into this. Now don't start whimperin'. You're goin' to be distributed over a million miles of space, just like the rest!"

The Venusian said: "But . . . but I'm not complaining, captain. I was just thinking—"

"Thinkin'!" sighed Hawkins disconsolately. "He says he was thinkin'! You done your share of thinkin' when you brung that . . . that juice-devourin' ampie on board. Shut up!"

WELL, I never thought I'd live to see the day! Do you know what happened? That little, meek Venusian got *mad!* Honest! He stamped his left pad, and his ears were just up on end with quivering excitement. Even his squeaky voice had a new authority. He piped:

"Oh, you Earthlings! You always think you know everything. I'm just trying to tell you there's a way to save the ship!"

Hawkins and McAndrews and I looked at him dazedly. Hawkins found his voice first. He said: "Huh? What's that?"

The Venusian turned to McAndrews. He said: "Chief . . . this engine room exits to the shell, doesn't it?"

McAndrews started. He gulped: "Why . . . why, yeah. It has a sail-casing to the hull, if that's what you mean—"

Sure, it did. That's why they called this type of craft a "lugger." Because it had two retractable lugsails, like airplane wings, that were thrown out for easy landing as soon as the ship got into

the Earth atmosphere. And where these lugsails joined the body, there were trap exits to the outer hull.

The Venusian cried: "That's what I mean. Very well, then, let's open it. No, never mind why. Time's getting short. Just open it."

Still moving like a man in a dream, McAndrews stepped to his control desk; punched a button. Of course, nothing happened. The retractables were connected with the circuit, and that was as cold as Pluto. The Venusian frowned.

"Oh, goodness!" he said petulantly. "I didn't allow for *that*. Chief, isn't there a manual control for the lugs?"

Chief said dubiously, "Yeah, but—"

"Then let's operate it. Quickly. It's only twenty minutes or so to the H layer now."

Chief showed us the lever. It was big, and it was awkward, and it was heavy and old. It hadn't been used for sixteen years, maybe. It was stiff and rusty. I was covered with perspiration and rust by the time the four of us, tugging for all we were worth, managed to get it started. But it creaked and grunted. It started swinging outward. A gap opened between the inner and outer casings of the hull. The gap began to widen.

"Everybody outside!" yelled the chief. "We ain't got spacesuits on. Beat it!"

We hightailed it for the door; slammed the safety seal behind us. Cap Hawkins demanded weakly: "What do we do now? Where do we go? How—"

"To your bridge," piped the Venusian. "I know it's going to work. We must watch and see—"

When we got to the bridge, we found Lieutenant Todd in a state of near collapse. He demanded hoarsely: "Captain, where have you been? I've been yelling my head off for you. Our batteries and motors have gone dead, and we're only ten minutes out of the Heaviside layer—with no shields!"

Cap said bluntly, "You know any prayers, Todd?"

Todd said, "Huh?" blankly.

"Because if *he's* wrong," said Hawkins, designating our Venusian stowaway, "you better get ready to say 'em."

But the Venusian wasn't paying any attention to the skipper's humorless humor. He had leaped to the *perilens* and was anxiously twisting it so he could view the left retractor lugsail which we had worked open. We all crowded about him, not knowing what was going on, but anxious to see the final act in that which meant either life or death to all of us.

WHAT I saw gave me an oversized case of the shudders. Before us, now plainly visible in the *perilens,* was the outer crust of the Heaviside. And when I say crust, I mean *crust.* Because even though its ionized substance is tenuous in the extreme, it possesses definite matter, in energy form. A force sufficient to ward off the sinister emanations that flood the ether, to protect Earth from evil radiation, to ward off meteorological hails.

Earth's pioneer scientists must have been pretty dumb not to have realized, ages ago, that the Heaviside layer is nothing more nor less than a miniature replica of the same phenomenon which they identified through their tiny 200-inch telescopes as the solar "corona." But you can't be too hard on them. They did the best they could with their small equipment and learning.

We were scooting along at a heluva speed for this crust. It grew nearer and nearer. It wavers a little, you know, and once a snagging tendril seemed to grope out toward us. I thought we were goners that time, but it missed us. I heard Cap Hawkins draw a deep breath, and Lieutenant Todd began to mutter. The little Venusian said, fretfully: "I can't be wrong! I just can't! *Pogo!*"

And then I saw it!

As if in answer to his muttered command, a milky-blue wraith began to emerge from the lug-wing orifice. It was the ampie—but such a huge ampie you never dreamed of. It was choked to the gorge with its meals: the ship's lighting current and the overflow of the driving generator. But it was still hungry.

It crept out and out—and as it crept, it spread! It began to twine itself, like a gigantic, glistening coil, about the ship. The Venusian twisted the *perilens* frantically, scanning all parts of the *Andromeda* from stem to stern; from figurehead to jets. And everywhere we saw the ampie, ever stretching, ever coiling; converting the *Andromeda* into a gigantic core, of which *it* was the helix!

The Venusian muttered: "I knew it! I knew it!"

And suddenly Cap Hawkins was yelling: "By golly! Now I see what you meant! If—"

I darned near died of curiosity. I said: "What does it mean? How will this—"

"Watch!" yelled Hawkins excitedly. His eyes were hot with anticipation.

And then we hit the Heaviside!

I shut my eyes. I thought, "Here we go!"

BUT we didn't go! I mean, we didn't go anywhere but straight on through. It was a cinch. It's a shame to even bother writing it down. It was just like going through with the generators going. Or like smooching through with a Moran H penetrant.

Only it was more sure, more effective, than either of those methods. Generators had been known to let down. Moran penetrants had been known to blow under heavy bombardment of the Heaviside—especially when it was as active as it was at this time.

But *we* went through without a jar, without an ounce of trouble; even without that funny, singing little sound of blasting electrical current that usually throbs in your eardrums when you pierce the shield. And as the Venusian continued to swing the *perilens* around, I saw why—

It was the ampie! That confounded little negatively energized beast was covering the *Andromeda* like a blanket! It was having the time of its life! Growing and growing, sprawling and spreading, having the biggest meal any ampie had ever dreamed of in its most fantastic nightmares—if ampies *have* nightmares!

It was as simple as that. The ampie, an ever-hungry creature of negative impulse, could not be troubled by the ionized heaviside layer. For why? Because it just ate up all the radiation that bombarded it—and wanted more!

We stood there, stunned with amazement. Then skipper let out a huge guffaw. He rubbed his big hands together.

"Old-fashioned, eh? A wallowing old tub, eh? Well, maybe so. But this will show them, boys. The *Andromeda* is the first boat to go through the Heaviside with what *I* predict will be the future safety equipment of every spaceship!"

The Venusian glowed with pleasure. He piped:

"I'm glad to hear you say so, captain. That's what I tried to tell the Safety Council months ago, but they wouldn't listen to me. I—"

Cap Hawkins' face turned red. He said:

"What? What's that? Why, you confounded little stowaway, what do you mean by taking credit for this?"

"I should," retorted the little man stanchly. "For, Captain Hawkins . . . well, permit me to introduce myself. I am Jar Farges, chief electrician for the Sun City Observatories. I developed the theory, months ago, that Venusian ampies would expand sufficiently to pro-

vide safe passage for space craft through the dangerous Heavisides of the various planets. But no one would listen to my theory, even though I had proven it experimentally in the lab. So—"

"So," said the skipper heavily, "you stowed away on the *Andromeda?* You deliberately permitted your ampie to eat up the ship's current. Endangered all our lives, in order to prove your theory, is that it?"

Jar Farges smiled.

"I think you must agree, captain, that your lives were not endangered. And," he hinted slyly, "since it is my intention to share the honor of this discovery with *you,* the IP Corporation may reasonably be expected to appoint you as skipper to one of its newest, ampie-shielded cruisers—"

Hawkins' mouth dropped open. He scratched his head. Then he grinned.

"Well!" he said. "Well, I'll be damned! And just to think . . . I put you in the clink, an' then made you help in the galley. Gosh, I— Hey, what was that!"

Mister, he had reason to ask! For we'd all jumped as we heard it. The loudest thunderclap I ever heard in my life. It echoed through the metal control room like the crack of doom. My ears were still ringing.

The Venusian scientist leaped to the *perilens.* He scanned it anxiously for a moment, then turned back to us.

"We're nearing the dock," he said.

"But . . . but that noise?" I yelled. "What was it? Is there something wrong?"

Jar Farges smiled.

"Nothing much," he piped. "It . . . it's Pogo. I think he ate too much. He's got a case of indigestion."

THERE'S JUST AS GOOD FISH—

ALIVE mosasaur or plesiosaur would be a nice addition to your aquarium, but we're fairly certain not to find any of these Mesozoic sea-monsters swimming around San Francisco Bay. They were true reptiles, hence air-breathers, hence surface-livers, and hence could hardly have been overlooked. However, last December the crew of a South African trawler, on pulling in their net, found among the two tons of fish flopping therein something that, zoölogically speaking, is quite as astonishing as a live plesiosaur would be. It was a five-foot steel-blue fish vaguely resembling one of the larger sea basses.

Fortunately for science, the captain of the trawler realized that he had something remarkable, and on reaching port telephoned the curator of the East London Museum. When the fish was dissected by South African scientists, it turned out to be not merely a new species, but a member of a family, the coelocanths (pronounced seela-canths) and an order, the *Actinistia,* that were supposed to have become extinct during the Cretaceous Period, along with the mosasaur, a good sixty million years ago! As far as we know, this fish has *no* really near relatives alive today, the nearest being the lung-fishes.

The number and distributions of fins is normal for a fish of this type, all but the tail fin and the forward dorsal fin are lobate—instead of being formed of rays projecting directly from the body, they consist of lobes (stubs like rudimentary limbs) with a fringe of rays around them. This type of fin-structure is found elsewhere today only among the African fringe-fins. But once it was common. In another branch of the Crossopterygian fishes, to which group the new coelocanth belongs, the lobes were evolved into the limbs of land animals. Thus our fish is not merely a living fossil, but one that belongs very close to our own branch of the tree of life, just a little below the amphibious *Eusthenopteron,* which was actually in the process of turning into a land animal.

The tail is also of an archaic type. Instead of having a single crescent-shaped caudal fin attached abaft the end of the backbone, like most modern fish, there are two separate fringes, one above and one below the tapering after end of the body.

The skeleton is only partly ossified; the vertebral spines are of bone, the vertebrae proper of cartilage. Other coelocanths had the strange feature of an ossified air-bladder; the new one may prove to have it, too, when dissection has progressed that far. After the fish was captured, no less than twenty gallons of oil oozed out between its large enameled scales.

The primitiveness of this fish theoretically allows it to evolve in any of a number of directions. It might, for instance, conceivably turn its lobes into limbs and crawl out on land. But, considering its size, and the fact that it has become adapted to living in fairly deep salt water, and the competition it would meet, it is very unlikely ever to do so now. It had its chance—and lost it one hundred and fifty million years ago.

The discovery has an ironic feature. Famous paleontologists, such as Professor Stensiö of Sweden, have spent years reconstructing the anatomy of the coelocanths from fragmentary fossil remains. Now all at once the entire internal organization of these fishes is, at it were, handed them on a fish-platter!

L. SPRAGUE DE CAMP.

THE BLUE GIRAFFE

By L. SPRAGUE DE CAMP

THE BLUE GIRAFFE

And the hippopotamus with green and pink spots, the two-headed rhino, Tweedle—and de Camp at his best!

By L. Sprague de Camp

Illustrated by Koll

ATHELSTAN CUFF was, to put it very mildly, astonished that his son should be crying. It wasn't that he had exaggerated ideas about Peter's stoicism, but the fact was that Peter never cried. He was, for a twelve-year-old boy, self-possessed to the point of grimness. And now he was undeniably sniffling. It must be something jolly well awful.

Cuff pushed aside the pile of manuscript he had been reading. He was editor of *Biological Review;* a stoutish Englishman with prematurely white hair, prominent blue eyes, and a complexion that could have been used for painting box cars. He looked a little like a lobster who had been boiled once and was determined not to repeat the experience.

"What's wrong, old man?" he asked.

Peter wiped his eyes and looked at his father calculatingly. Cuff sometimes wished that Peter wasn't so damned rational. A spot of boyish unreasonableness would be welcome at times.

"Come on, old fella, out with it. What's the good of having a father if you can't tell him things?"

Peter finally got it out. "Some of the guys—" He stopped to blow his nose. Cuff winced slightly at the "guys." His one regret about coming to America was the language his son picked up. As he didn't believe in pestering Peter all the time, he had to suffer in silence.

"Some of the guys say you aren't really my father."

It had come, thought Cuff, as it was bound to sooner or later. He shouldn't have put off telling the boy for so long.

"What do you mean, old man?" he stalled.

"They say," *sniff,* "I'm just a 'dopted boy."

Cuff forced out, "So what?" The despised Americanism seemed to be the only thing that covered the situation.

"What do you mean, 'so what'?"

"I mean just that. What of it? It doesn't make a particle of difference to your mother or me, I assure you. So why should it to you?"

Peter thought. "Could you send me away some time, on account of I was only 'dopted?"

"Oh, so that's what's worrying you? The answer is no. Legally you're just as much our son as if . . . as anyone is anybody's son. But whatever gave you the idea we'd ever send you away? I'd like to see that chap who could get you away from us."

"Oh, I just wondered."

"Well, you can stop wondering. We don't want to, and we couldn't if we did. It's perfectly all right, I tell you. Lots of people start out as adopted children, and it doesn't make any difference to anybody. You wouldn't get up-

set if somebody tried to make fun of you because you had two eyes and a nose, would you?"

Peter had recovered his composure. "How did it happen?"

"It's quite a story. I'll tell you, if you like."

Peter only nodded.

"I've told you," said Athelstan Cuff, "about how before I came to America I worked for some years in South Africa. I've told you about how I used to work with elephants and lions and things, and about how I transplanted some white rhino from Swaziland to the Kruger Park. But I've never told you about the blue giraffe—"

IN the 1940s the various South African governments were considering the problem of a park that would be not merely a game preserve available to tourists, but a completely wild area in which no people other than scientists and wardens would be allowed. They finally agreed on the Okavango River Delta in Ngamiland, as the only area that was sufficiently large and at the same time time thinly populated.

The reasons for its sparse population were simple enough: nobody likes to settle down in a place when he is likely to find his house and farm under three feet of water some fine morning. And it is irritating to set out to fish in a well-known lake only to find that the lake has turned into a grassy plain around the edges of which the mopane trees are already springing up.

So the Batawana, in whose reserve the Delta lay, were mostly willing to leave this capricious stretch of swamp and jungle to the elephant and the lion. The few Batawana who did live in and around the Delta were bought out and moved. The Crown Office of the Bechuanaland Protectorate got around its own rules against alienation of tribal lands by taking a perpetual lease on the Delta and surrounding territory from the Batawana, and named the whole area Jan Smuts Park.

WHEN Athelstan Cuff got off the train at Francistown in September of 1976, a pelting spring rain was making the platform smoke. A tall black in khaki loomed out of the grayness, and said: "You are Mr. Cuff, from Cape Town? I'm George Mtengeni, the warden at Smuts. Mr. Opdyck wrote me you were coming. The Park's car is out this way."

Cuff followed. He'd heard of George Mtengeni. The man wasn't a Chwana at all, but a Zulu from near Durban. When the Park had been set up, the Batawana had thought that the warden ought to be a Tawana. But the Makoba, feeling chesty about their independence from their former masters, the Batawana, had insisted on his being one of their nation. Finally the Crown Office in disgust had hired an outsider. Mtengeni had the very dark skin and narrow nose found in so many of the Kaffir Bantu. Cuff guessed that he probably had a low opinion of the Chwana people in general and the Batawana in particular.

They got into the car. Mtengeni said: "I hope you don't mind coming way out here like this. It's too bad that you couldn't come before the rains started; the pans they are all full by now."

"So?" said Cuff. "What's the Mababe this year?" He referred to the depression known variously as Mababe Lake, Swamp, or Pan, depending on whether at a given time it contained much, little, or no water.

"The Mababe, it is a lake, a fine lake full of drowned trees and hippo. I think the Okavango is shifting north again. That means Lake Ngami it will dry up again."

"So it will. But look here, what's all this business about a blue giraffe? Your letter was dashed uninformative."

Mtengeni showed his white teeth. "It

appeared on the edge of the Mopane Forest seventeen months ago. That was just the beginning. There have been other things since. If I'd told you more, you would have written the Crown Office saying that their warden was having a nervous breakdown. Me, I'm sorry to drag you into this, but the Crown Office keeps saying they can't spare a man to investigate."

"Oh, quite all right, quite," answered Cuff. "I was glad to get away from Cape Town anyway. And we haven't had a mystery since old Hickey disappeared."

"Since who disappeared? You know me, I can't keep up with things out in the wilds."

"Oh, that was many years ago. Before your time, or mine for that matter. Hickey was a scientist who set out into the Kalahari with a truck and a Xosa assistant, and disappeared. Men flew all over the Kalahari looking for him, but never found a trace, and the sand had blown over his tire tracks. Jolly odd, it was."

The rain poured down steadily as they wallowed along the dirt road. Ahead, beyond the gray curtain, lay the vast plains of northern Bechuanaland with their great pans. And beyond the plains were, allegedly, a blue giraffe, and other things.

THE SPIDERY steelwork of the tower hummed as they climbed. At the top, Mtengeni said: "You can look over that way . . . west . . . to the other side of the forest. That's about twenty miles."

Cuff screwed up his eyes at the eyepieces. "Jolly good 'scope you've got here. But it's too hazy beyond the forest to see anything."

"It always is, unless we have a high wind. That's the edge of the swamps."

"Dashed if I see how you can patrol such a big area all by yourself."

"Oh, these Bechuana they don't give much trouble. They are honest. Even I have to admit that they have some good qualities. Anyway, you can't get far into the Delta without getting lost in the swamps. There are ways, but then, I only know them. I'll show them to you, but please don't tell these Bechuana about them. Look, Mr. Cuff, there's our blue giraffe."

Cuff started. Mtengeni was evidently the kind of man who would announce an earthquake as casually as the morning mail.

Several hundred yards from the tower half a dozen giraffes were moving slowly through the brush, feeding on the tops of the scrubby trees. Cuff swung the telescope on them. In the middle of the herd was the blue one. Cuff blinked and looked again. There was no doubt about it; the animal was as brilliant a blue as if somebody had gone over it with paint. Athelstan Cuff suspected that that was what somebody *had* done. He said as much to Mtengeni.

The warden shrugged. "That, it would be a peculiar kind of amusement. Not to say risky. Do you see anything funny about the others?"

Cuff looked again. "Yes . . . by Jove, one of 'em's got a beard, like a goat; Only it must be six feet long, at least. Now look here, George, what's all this leading up to?"

"I don't know myself. To-morrow, if you like, I'll show you one of those ways into the Delta. But that, it's quite a walk, so we'd better take supplies for two or three days."

AS THEY drove toward the Tamalakane, they passed four Batawana, sad-looking reddish-brown men in a mixture of native and European clothes. Mtengeni slowed the car and looked at them suspiciously as they passed, but there was no evidence that they had been poaching.

He said: "Ever since their Makoba slaves were freed, they've been going on

a . . . decline, I suppose you would call it. They are too dignified to work."

They got out at the river. "We can't drive across the ford this time of year," explained the warden, locking the car. "But there's a rapid little way down where we can wade."

They walked down the trail, adjusting their packs. There wasn't much to see. The view was shut off by the tall soft-bodied swamp plants. The only sound was the hum of insects. The air was hot and steamy already, though the sun had been up only half an hour. The flies drew blood when they bit, but the men were used to that. They simply slapped and waited for the next bite.

Ahead there was a deep gurgling noise, like a foghorn with water in its works. Cuff said: "How are your hippo doing this year?"

"Pretty good. There are some in particular that I want you to see. Ah, here we are."

They had come in sight of a stretch of calm water. In the foreground a hippopotamus repeated its foghorn bellow. Cuff saw others, of which only the eyes, ears, and nostrils were visible. One of them was moving; Cuff could make out the little V-shaped wakes pointing back from its nearly submerged head. It reached the shallows and lumbered out, dripping noisily.

Cuff blinked. "Must be something wrong with my eyes."

"No," said Mtengeni. "That hippo, she is one of those I wanted you to see."

The hippopotamus was green with pink spots.

She spied the men, grunted suspiciously, and slid back into the water.

"I still don't believe it," said Cuff. "Dash it, man, that's impossible."

"You will see many more things," said Mtengeni. "Shall we go on?"

They found the rapid and struggled across; then walked along what might, by some stretch of the imagination, he called a trail. There was little sound other than their sucking footfalls, the hum of insects, and the occasional screech of a bird or the crashing of a buck through the reeds.

THEY walked for some hours. Then Mtengeni said: "Be careful. There is a rhino near."

Cuff wondered how the devil the Zulu knew, but he was careful. Presently they came on a clear space in which the rhinoceros was browsing.

The animal couldn't see them at that distance, and there was no wind to carry their smell. It must have heard them, though, for it left off its feeding and snorted, once, like a locomotive. It had two heads.

It trotted toward them sniffing.

The men got out their rifles. "My God!" said Athelstan Cuff. "Hope we don't have to shoot him. My God!"

"I don't think so," said the warden. "That's Tweedle. I know him. If he gets too close, give him one at the base of the horn and he . . . he will run."

"Tweedle?"

"Yes. The right head is Tweedledum and the left is Tweedledee," said Mtengeni solemnly. "The whole rhino I call Tweedle."

The rhinoceros kept coming. Mtengeni said: "Watch this." He waved his hat and shouted: "Go away! *Footsack!*"

Tweedle stopped and snorted again. Then he began to circle like a waltzing mouse. Round and round he spun.

"We might as well go on," said Mtengeni. "He will keep that up for hours. You see Tweedledum is fierce, but Tweedledee, he is peaceful, even cowardly. So when I yell at Tweedle, Tweedledum wants to charge us, but Tweedledee, he wants to run away. So the right legs go forward and the left legs go back, and Tweedle, he goes in circles. It takes him some time to agree on a policy."

"Whew!" said Athelstan Cuff. "I

say, have you got any more things like this in your zoo?"

"Oh yes, lots. That's what I hope you'll do something about."

Do something about this! Cuff wondered whether this was touching evidence of the native's faith in the white's omniscience, or whether Mtengeni had gotten him there for the cynical amusement of watching him run in useless circles. Mtengeni himself gave no sign of what he was thinking.

Cuff said: "I can't understand, George, why somebody hasn't looked into this before."

Mtengeni shrugged. "Me, I've tried to get somebody to, but the government won't send anybody, and the scientific expeditions, there haven't been any of them for years. I don't know why."

"I can guess," said Cuff. "In the old days people even in the so-called civilized countries expected travel to be a jolly rugged proposition, so they didn't mind putting up with a few extra hardships on trek. But now that you can ride or fly almost anywhere on soft cushions, people won't put themselves out to get to a really uncomfortable and out-of-the-way place like Ngamiland."

Over the swampy smell came another, of carrion. Mtengeni pointed to the carcass of a waterbuck fawn, which the scavengers had apparently not discovered yet.

"That's why I want you to stop this whatever-it-is," he said. There was real concern in his voice.

"What do you mean, George?"

"Do you see its legs?"

Cuff looked. The forelegs were only half as long as the hind ones.

"That buck," said the Zulu. "It naturally couldn't live long. All over the Park, freaks like this they are being born. Most of them don't live. In ten years more, maybe twenty, all my animays will have died out because of this. Then my job, where is it?"

THEY stopped at sunset. Cuff was glad to. It had been some time since he'd done fifteen miles in one day, and he dreaded the morrow's stiffness. He looked at his map and tried to figure out where he was. But the cartographers had never seriously tried to keep track of the changes in the Okavango's multifarious branches, and had simply plastered the whole Delta with little blue dashes with tufts of blue lines sticking up from them, meaning simply "swamp." In all directions the country was a monotonous alternation of land and water. The two elements were inextricably mixed.

The Zulu was looking for a dry spot free of snakes. Cuff heard him suddenly shout *"Footsack!"* and throw a clod at a log. The log opened a pair of jaws, hissed angrily, and slid into the water.

"We'll have to have a good fire," said Mtengeni, hunting for dry wood. "We don't want a croc or hippo wandering into our tent by mistake."

After supper they set the automatic bug-sprayer going, inflated their mattresses, and tried to sleep. A lion roared somewhere in the west. That sound no African, native or Africander, likes to head when he is on foot at night. But the men were not worried; lions avoided the swampy areas. The mosquitoes presented a more immediate problem.

Many hours later, Athelstan Cuff heard Mtengeni getting up.

The warden said: "I just remembered a high spot half a mile from here, where there's plenty of firewood. Me, I'm going out to get some."

Cuff listened to Mtengeni's retreating steps in the soft ground; then to his own breathing. Then he listened to something else. It sounded like a human yell.

He got up and pulled on his boots quickly. He fumbled around for the flashlight, but Mtengeni had taken it with him.

The yell came again.

Cuff found his rifle and cartridge belt in the dark and went out. There was enough starlight to walk by if you were careful. The fire was nearly out. The yells seemed to come from a direction opposite to that in which Mtengeni had gone. They were high-pitched, like a woman's screams.

He walked in their direction, stumbling over irregularities in the ground and now and then stepping up to his calves in unexpected water. The yells were plainer now. They weren't in English. Something was also snorting.

He found the place. There was a small tree, in the branches of which somebody was perched. Below the tree a noisy bulk moved around. Cuff caught the outline of a sweeping horn, and knew he had to deal with a buffalo.

He hated to shoot. For a Park official to kill one of his charges simply wasn't done. Besides, he couldn't see to aim for a vital spot, and he didn't care to try to dodge a wounded buffalo in the dark. They could move with race-horse speed through the heaviest growth.

On the other hand, he couldn't leave even a poor fool of a native woman treed. The buffalo, if it was really angry, would wait for days until its victim weakened and fell. Or it would butt the tree until the victim was shaken out. Or it would rear up and try to hook the victim out with its horns.

Athelstan Cuff shot the buffalo. The buffalo staggered about a bit and collapsed.

The victim climbed down swiftly, pouring out a flood of thanks in Xosa. It was very bad Xosa, even worse than the Englishman's. Cuff wondered what she was doing here, nearly a thousand miles from where the Maxosa lived. He assumed that she was a native, though it was too dark to see. He asked her if she spoke English, but she didn't seem to understand the question, so he made shift with the Bantu dialect.

"Uveli phi na?" he asked sternly. "Where do you come from? Don't you know that nobody is allowed in the Park without special permission?"

"Izwe kamafene wabantu," she replied.

"What? Never heard of the place. Land of the baboon people, indeed! What are you?"

"Ingwamza."

"You're a white stork? Are you trying to be funny?"

"I didn't say I was a white stork. Ingwamza's my name."

"I don't care about your name. I want to know what you *are*."

"Umfene umfazi."

Cuff controlled his exasperation. "All right, all right, you're a baboon woman. I don't care what clan you belong to. What's your tribe? Batawana, Bamangwato, Bangwaketse, Barolong, Herero, or what? Don't try to tell me you're a Xosa; no Xosa ever used an accent like that."

"Amafene abantu."

"What the devil are the baboon people?"

"People who live in the Park."

Cuff resisted the impulse to pull out two handfuls of hair by the roots. "But I tell you nobody lives in the Park! It isn't allowed! Come now, where do you really come from and what's your native language and why are you trying to talk Xosa?"

"I told you, I live in the Park. And I speak Xosa because all we *amafene abantu* speak it. That's the language Mqhavi taught us."

"Who is Mqhavi?"

"The man who taught us to speak Xosa."

Cuff gave up. "Come along, you're going to see the warden. Perhaps he can make some sense out of your gab-

ble. And you'd better have a good reason for trespassing, my good woman, or it'll go hard with you. Especially as it resulted in the killing of a good buffalo." He started off toward the camp, making sure that Ingwamza followed him closely.

THE FIRST THING he discovered was that he couldn't see the light of any fire to guide him back. Either he'd come farther than he thought, or the fire had died altogether while Mtengeni was getting wood. He kept on for a quarter of an hour in what he thought was the right direction. Then he stopped. He had, he realized, not the vaguest idea of where he was.

He turned *"Sibaphi na?"* he snapped. "Where are we?"

"In the Park."

Cuff began to wonder whether he'd ever succeed in delivering this native woman to Mtengeni before he strangled her with his bare hands. "I know we're in the Park," he snarled. "But *where* in the Park?"

"I don't know, exactly. Somewhere near my people's land."

"That doesn't do me any good. "Look: I left the warden's camp when I heard you yell. I want to get back to it. Now how do I do it?"

"Where is the warden's camp?"

"I don't know, stupid. If I did I'd go there."

"If you don't know where it is, how do you expect me to guide you thither? I don't know either."

Cuff made strangled noises in his throat. Inwardly he had to admit that she had him there, which only made him madder. Finally he said: "Never mind, Suppose you take me to your people. Maybe they have somebody with some sense."

"Very well," said the native woman, and she set off at a rapid pace, Cuff stumbling after her vague outline. He began to wonder if maybe she wasn't right about living in the Park. She seemed to know where she was going.

"Wait," he said. He ought to write a note to Mtengeni, explaining what he was up to, and stick it on a tree for the warden to find. But there was no pencil or paper in his pockets. He didn't even have a match safe or a cigarette lighter. He'd taken all those things out of his pockets when he'd lain down.

They went on a way, Cuff pondering on how to get in touch with Mtengeni. He didn't want himself and the warden to spend a week chasing each other around the Delta. Perhaps it would be better to stay where they were and build a fire—but again, he had no matches, and didn't see much prospect of making a fire by rubbing sticks in this damned damp country.

Ingwamza said: "Stop. There are buffalo ahead."

Cuff listened and heard faintly the sound of snapping grass stems as the animals fed.

She continued: "We'll have to wait until it gets light. Then maybe they'll go away. If they don't, we can circle around them, but I couldn't find the way around in the dark."

They found the highest point they could and settled down to wait. Something with legs had crawled inside Cuff's shirt. He mashed it with a slap.

He strained his eyes into the dark. It was impossible to tell how far away the buffalo were. Overhead a nightjar brought it wings together with a single startling clap. Cuff told his nerves to behave themselves. He wished he had a smoke.

The sky began to lighten. Gradually Cuff was able to make out the black bulks moving among the reeds. They were at least two hundred yards away. He'd have preferred that they were at twice the distance, but it was better than stumbling right on them.

It became lighter and lighter. Cuff

never took his eyes off the buffalo. There was something queer about the nearest one. It had six legs.

Cuff turned to Ingwamza and started to whisper: "What kind of buffalo do you call—" Then he gave a yell of pure horror and jumped back. His rifle went off, tearing a hole in his boot.

He had just gotten his first good look at the native woman in the rapidly waxing dawn. Ingwamza's head was that of an overgrown chacma baboon.

The buffalo stampeded through the feathery papyrus. Cuff and Ingwamza stood looking at each other. Then Cuff looked at his right foot. Blood was running out of the jagged hole in the leather.

"What's the matter? Why did you shoot yourself?" asked Ingwamza.

Cuff couldn't think of an answer to that one. He sat down and took off his boot. The foot felt numb, but there seemed to be no harm done aside from a piece of skin the size of a sixpence gouged out of the margin. Still, you never knew what sort of horrible infection might result from a trifling wound in these swamps. He tied his foot up with his handkerchief and put his boot back on.

"Just an accident," he said. "Keep going, Ingwamza."

Ingwamza went, Cuff limping behind. The sun would rise any minute now. It was light enough to make out colors. Cuff saw that Ingwamza, in describing herself as a baboon-woman, had been quite literal, despite the size, general proportions, and posture of a human being. Her body, but for the greenish-yellow hair and the short tail, might have passed for that of a human being, if yon weren't too particular. But the astonishing head with its long bluish muzzle gave her the appearance of an Egyptian animal-headed god. Cuff wondered vaguely if the *'fene abantu* were a race of man-monkey hybrids. That was imposible, of course. But he'd seen so many impossible things in the last couple of days.

She looked back at him. "We shall arrive in an hour or two. I'm sleepy." She yawned. Cuff repressed a shudder at the sight of four canine teeth big enough for a leopard. Ingwamza could tear the throat out of a man with those fangs as easily as biting the end off a banana. And he'd been using his most hectoring colonial-administrator tone on her in the dark! He made a resolve never to speak harshly to anybody he couldn't see.

INGWAMZA pointed to a carrotty baobab against the sky. *"Izwe kamagene wabantu."* They had to wade a little stream to get there. A six-foot monitor lizard walked across their path, saw them, and disappeared with a scuttle.

The *'fene abantu* lived in a village much like that of any Bantu people, but the circular thatched huts were smaller and cruder. Baboon people ran out to peer at Cuff and to feel his clothes. He gripped his rifle tightly. They didn't act hostile, but it gave you a dashed funny feeling. The males were larger than the females, with even longer muzzles and bigger tusks.

In the center of the village sat a big *umfene umntu* scratching himself in front of the biggest hut. Ingwamza said: "This is my father, the chief. His name is Indlovu." To the baboon-man she told of her rescue.

The chief was the only *umfene umntu* that Cuff had seen who wore anything. What he wore was a necktie. The necktie had been a gaudy thing once.

The chief got up and made a speech, the gist of which was that Cuff had done a great thing, and that Cuff would be their guest until his wound healed. Cuff had a chance to observe the difficulties that the *'fene abantu* had with the Xosa tongue. The clicks were blurred, and

The beast twisted with every step, and his saddleless back was built like a fakir's bed.

they stumbled badly over the lip-smack. With those mouths, he could see how they might.

But he was only mildly interested. His foot was hurting like the very devil. He was glad when they led him into a hut so he could take off his boot. The hut was practically unfurnished. Cuff asked the *'fene abantu* if he might have some of the straw used for thatching. They seemed puzzled by his request, but complied, and he made himself a bed of sorts. He hated sleeping on the ground, especially on ground infested with anthropodal life. He hated vermin, and knew he was in for an intimate acquaintance with them.

He had nothing to bandage his foot with, except the one handkerchief, which was now thoroughly bloodsoaked. He'd have to wash and dry it before it would be fit to use again. And where in the Okavango Delta could he find water fit to wash the handkerchief in? Of course he could boil the water. In what? He was relieved and amazed when his questions brought forth the fact that there was a large iron pot in the village, obtained from God knew where.

The wound had clotted satisfactorily, and he dislodged the handkerchief with infinite care from the scab. While his water was boiling, the chief, Indlovu, came in and talked to him. The pain in his foot had subsided for the moment, and he was able to realize what an extraordinary thing he had come across, and to give Indlovu his full attention. He plied Indlovu with questions.

The chief explained what he knew about himself and his people. It seemed that he was the first of the race; all the others were his descendants. Not only Ingwamza but all the older *amafene abafazi* were his daughters. Ingwamza was merely the last. He was old now. He was hazy about dates, but Cuff got the impression that these beings had a shorter life span than human beings, and matured much more quickly. If they were in fact baboons, that was natural enough.

Indlovu didn't remember having had any parents. The earliest he remembered was being led around by Mqhavi. Stanley H. Mqhavi had been a black man, and worked for the machine man, who had been a pink man like Cuff. He had had a machine up on the edge of the Chobe swamp. His name had been Heeky.

OF COURSE, Hickey! thought Cuff. Now, he was getting somewhere. Hickey had disappeared by simply running his truck up to Ngamiland without bothering to tell anybody where he was going. That had been before the Park had been established; before Cuff had come out from England. Mqhavi must have been his Xosa assistant. His thoughts raced ahead of Indlovu's words.

Indlovu went on to tell about how Heeky had died, and how Mqhavi, not knowing how to run the machine, had taken him, Indlovu, and his now numerous progeny in an attempt to find his way back to civilization. He had gotten lost in the Delta. Then he had cut his foot somehow, and gotten sick, very sick. Cuff looked uneasily at his own foot. When he, Mqhavi, had gotten well he had been very weak. So he had settled down with Indlovu and his family. They already walked upright and spoke Xosa, which Mqhavi had taught them. Cuff got the idea that the early family relationships among the *'fene abantu* had of necessity involved close inbreeding. Mqhavi had taught them all he knew, and then died, after warning them not to go within a mile of the machine, which, as far as they knew, was still up at the Chobe swamp.

Cuff thought, that blasted machine is an electronic tube of some sort, built to throw short waves of the length to affect animal genes. Probably Indlovu represented one of Hickey's early experiments. Then Hickey had died, and

—left the thing going. He didn't know how it got power; some solar system, perhaps.

Suppose Hickey had died while the thing was turned on. Mqhavi might have dragged his body out and left the door open. He might have been afraid to try to turn it off, or he might not have thought of it. So every animal that passed that doorway got a dose of the rays, and begat monstrous offspring. These super-baboons were one example; whether an accidental or a controlled mutation might never be known.

For every useful mutation there were bound to be scores of useless or harmful ones. Mtengeni had been right: it had to be stopped while there were still normal stock left in the Park. He wondered again how to get in touch with the warden. He'd be damned if anything short of the threat of death would get him to walk on that foot, for a few days anyhow.

INGWAMZA entered with a wooden dish full of a mess of some sort. Athelstan Cuff decided resignedly that he was expected to eat it. He couldn't tell by looking whether it was animal or vegetable in nature. After the first mouthful he was sure it was neither. Nothing in the animal and vegetable worlds could taste as awful as that. It was too bad Mqhavi hadn't been a Bamangwato; he'd have really known how to cook, and could have taught these monkeys. Still, he had to eat something to support life. He fell to with the wooden spoon they gave him, suppressing an occasional gag and watching the smaller solid particles closely. Sure enough, he had to smack two of them with the spoon to keep them from crawling out.

"How is it?" asked Ingwabza. Indlovu had gone out.

"Fine," lied Cuff. He was chasing a slimy piece of what he suspected was waterbuck tripe around the dish.

"I am glad. We'll feed you a lot of that. Do you like scorpions?"

"You mean to *eat?*"

"Of course. What else are they good for?"

He gulped. "No."

"I won't give you any then. You see I'm glad to know what my future husband likes."

"What?" He thought he had misunderstood her.

"I said, I am glad to know what you like, so I can please you after you are my husband."

Athelstan Cuff said nothing for sixty seconds. His naturally prominent eyes bulged even more as her words sank in. Finally he spoke.

"Gluk," he said.

"What's that?"

"Gug. Gah. My God. Let me out of here!" His voice jumped two octaves, and he tried to get up. Ingwamza caught his shoulders and pushed him gently, but firmly, back on his pallet. He struggled, but without visibly exerting herself the *'fene umfazi* held him as in a vise.

"You can't go," she said. "If you try to walk on that foot you will get sick."

His ruddy face was turning purple. "Let me up! Let me up, I say! I can't stand this!"

"Will you promise not to try to go out if I do? Father would be furious if I let you do anything unwise."

He promised, getting a grip on himself again. He already felt a bit foolish about his panic. He was in a nasty jam, certainly, but an official of His Majesty didn't act like a frightened schoolgirl at every crisis.

"What," he asked, "is this all about?"

"Father is so grateful to you for saving my life that he intends to bestow me on you in marriage, without even asking a bride price."

"But . . . but . . . I'm married already." He lied.

"What of it? I'm not afraid of your other wives. If they got fresh, I'd tear them in piece like this." She bared her teeth and went through the motions of tearing several Mistresses Cuff in pieces. Athelstan Cuff shut his eyes at the horrid sight.

"Among my people," he said, "you're allowed only one wife."

"That's too bad," said Ingwamza. "That means that you couldn't go back to your people after you married me, doesn't it?"

Cuff sighed. These *'fene abantu* combined the mental outlook of uneducated Maxosa with physical equipment that would make a lion think twice before attacking one. He'd probably have to shoot his way out. He looked around the hut craftily. His rifle wasn't in sight. He didn't dare ask about it for fear of arousing suspicion.

"Is your father set on this plan?" he asked.

"Oh, yes, very. Father is a good *umntu,* but he gets set on ideas like this and nothing will make him change them. And he has a terrible temper. If you cross him when he has his heart set on something, he will tear you in pieces. *Small* pieces." She seemed to relish the phrase.

"How do *you* feel about it, Ingwamza?"

"Oh, I do everything father says. He knows more than any of us."

"Yes, but I mean you personally. Forget about your father for the moment."

She didn't quite catch on for a moment, but after further explanation she said: "I wouldn't mind. It would be a great thing for my people if one of us was married to a man."

Cuff silently thought that that went double for him.

Indlovu came in with two other *amafene abantu.* "Run along, Ingwamza," he said. The three baboon-men squatted around Athlestan Cuff and began questioning him about men and the world outside the Delta.

When Cuff stumbled over a phrase, one of the questioners, a scarred fellow named Sondlo, asked why he had difficulty. Cuff explained that Xosa wasn't his native language.

"Men do speak other languages?" asked Indlovu. "I remember now, the great Mqhavi once told me something to that effect. But he never taught me any other languages. Perhaps he and Heeky spoke one of these other languages, but I was too young when Heeky died to remember."

Cuff explained something about linguistics. He was immediately pressed to "say something in English." Then they wanted to learn English, right then, that afternoon.

CUFF finished his evening meal and looked without enthusiasm at his pallet. No artificial light, so these people rose and set wth the sun. He stretched out. The straw rustled. He jumped up, bringing his injured foot down hard. He yelped, swore, and felt the bandage. Yes, he'd started it bleeding again. Oh, to hell with it. He attacked the straw, chasing out a mouse, six cockroaches, and uncounted smaller bugs. Then he stretched out again. Looking up, he felt his scalp prickle. A ten-inch centipede was methodically hunting its prey over the underside of the roof. If it missed its foooting when it was right over him— He unbuttoned his shirt and pulled it up over his face. Then the mosquitoes attacked his midriff. His foot throbbed.

A step brought him up; it was Ingwanza.

"What is it now?" he asked.

"Ndiya kuhlaha apha," she answered.

"Oh no, you're not going to stay here. We're not . . . well, anyway, it simply isn't done among my people."

"But Esselten, somebody must watch

you in case you get sick. My father—"

"No, I'm sorry, but that's final. If you're going to marry me you'll have to learn how to behave among men. And we're beginning right now."

To his surprise and relief, she went without further objection, albeit sulkily. He'd never have dared to try to put her out by force.

When she had gone, he crawled over to the door of the hut. The sun had just set, and the moon would follow it in a couple of hours. Most of the *'fene abantu* had retired. But a couple of them squatted outside their huts, in sight of his place, watchfully.

Heigh ho, he thought, they aren't taking any chances. Perhaps the old boy *is* grateful and all that rot. But I think my fiancée let the cat out when she said that about the desirability of hitching one of the tribe to a human being. Of course the poor things don't know that it wouldn't have any legal standing at all. But that fact wouldn't save me from a jolly unpleasant experience in the meantime. Suppose I haven't escaped by the time of the ceremony. Would I go through with it? *Br-r-r!* Of course not. I'm an Englishman, and an officer of the Crown. But if it meant my life . . . I don't know. I'm dashed if I do. Perhaps I can talk them out of it . . . being careful not to get them angry in the process—

HE WAS tied to the straw, and enormous centipedes were dropping off the ceiling onto his face. Then he was running through the swamp, with Ingwamza and her irate pa after him. His feet stuck in the mud so he couldn't move, and there was a light in his face. Mtengeni—good old George!—was riding a two-headed rhino. But instead of rescuing him, the warden said: "Mr. Cuff, you must do something about these Bechuana. Them, they are catching all my animals and painting them red with green stripes." Then he woke up.

It took him a second to realize that the light was from the setting moon, not the rising sun, and that he therefore had been asleep less than two hours. It took him another second to realize what had wakened him. The straw of the hut wall had been wedged apart, and through the gap a *'fene umntu* was crawling. While Cuff was still wondering why one of his hosts, or captors, should use this peculiar method of getting in, the baboon-man stood up. He looked enormous in the faint light.

"What is it?" asked Cuff.

"If you make a noise," said the stranger, "I will kill you."

"What? What's the idea? Why should you want to kill me?"

"You have stolen my Ingwamza."

"But . . . but—" Cuff was at a loss. Here the gal's old man would tear him in pieces—*small* pieces—if he didn't marry her, and a rival or something would kill him if he did. "Let's talk it over first," he said, in what he hoped was a normal voice. "Who are you, by the way?"

"My name is Cukata. I was to have married Ingwamza next month. And then you came."

"What . . . what—"

"I won't kill you. Not if you make no noise. I will just fix you so you won't marry Ingwamza." He moved toward the pile of straw.

Cuff didn't waste time inquiring into the horrid details. "Wait a minute," he said, cold sweat bedewing not merely his brow, but his whole torso. "My dear fellow, this marriage wasn't my idea. It was Indlovu's, entirely. I don't want to steal your girl. They just informed me that I was going to marry her, without asking me about it at all. I don't *want* to marry her. In fact there's nothing I want to do less."

The *'fene umntu* stood still for a moment, thinking. Then he said softly: "You wouldn't marry my Ingwamza **if**

you had the chance? You think she is ugly?"

"Well—"

"By u-Qamata, that's an insult! Nobody shall think such thoughts of my Ingwamza! Now I will kill you for sure!"

"Wait, wait!" Cuff's voice, normally a pleasant low baritone, became a squeak. "That isn't it at all! She's beautiful, intelligent, industrious, all that a *'ntu* could want. But I can never marry her." Inspiration! Cuff went on rapidly. Never had he spoken Xosa so fluently. "You know that if lion mates with leopard, there are no offspring." Cuff wasn't sure that was so, but he took a chance. "It is that way with my people and yours. We are too different. There would be no issue to our marriage, and Indlovu would not have grandchildren by us to gladden his old age."

Cukata, after some thought, saw, or thought he did. "But," he said. "How can I prevent this marriage without killing you?"

"You could help me escape."

"So. Now that's an idea. Where do you want to go?"

"Do you know where the Hickey machine is?"

"Yes, though I have never been close to it. That is forbidden. About fifteen miles north of here, on the edge of the Chobe Swamp, is a rock. By the rock are three baobab trees, close together. Between the trees and the swamp are two houses. The machine is in one of those houses."

He was silent again. "You can't travel fast with that wounded foot. They would overtake you. Perhaps Indlovu would tear you in pieces, or perhaps he would bring you back. If he brought you back, we should fail. If he tore you in pieces, I should be sorry, for I like you, even if you are a feeble little *isipham-pham.*" Cuff wished that the simian brain would get around to the point. "I have it. In ten minutes I shall whistle. You will then crawl out through this hole in the wall, making no noise. You understand?"

WHEN Athelstan Cuff crawled out, he found Cukata in the alley between two rows of huts. There was a strong reptilian stench in the air. Behind the baboon-man was something large and black. It walked with a swaying motion. It brushed against Cuff, and he almost cried out at the touch of cold, leathery hide.

"This is the largest," said Cukata. "We hope some day to have a whole herd of them. They are fine for traveling across the swamps, because they can swim as well as run. And they grow much faster than the ordinary crocodile."

The thing was a crocodile—but such a crocodile! Though not much over fifteen feet in length, it had long, powerful legs that raised its body a good four feet off the ground, giving it a dinosaurian look. It rubbed against Cuff, and the thought occurred to him that it had taken an astonishing mutation indeed to give a brainless and voracious reptile an affection for human beings.

Cukata handed Cuff a knobkerry, and explained: "Whistle, loudly, when you want him to come. To start him, hit him on the tail with this. To stop him, hit him on the nose. To make him go to the left, hit him on the right side of the neck, not too hard. To make him go to the right, his him—"

"On the left side of the neck, but not too hard," finished Cuff. "What does he eat?"

"Anything that is meat. But you needn't feed him for two or three days; he has been fed recently."

"Don't you use a saddle?"

"Saddle? What's that?"

"Never mind." Cuff climbed aboard, wincing as he settled onto the sharp dorsal ridges of the animal's hide.

"Wait," said Cukata. "The moon will be completely gone in a moment. Remember, I shall say that I know nothing about your escape, but that you got out and stole him yourself His name Soga."

THERE WERE the baobab trees, and there were the houses. There were also a dozen elephants, facing the rider and his bizarre mount and spreading their immense ears. Athelstan Cuff was getting so blasé about freaks that he hardly noticed that two of the elephants had two trunks apiece; that another of them was colored a fair imitation of a Scotch tartan; that another of them had short legs like a hippopotamus, so that it looked like something out of a dachshund breeder's nightmare.

The elephants, for their part, seemed undecided whether to run or to attack, and finally compromised by doing nothing. Cuff realized when he was already past them that he had done a wickedly reckless thing in going so close to them unarmed except for the useless kerry. But somehow he couldn't get excited about mere elephants. His whole life for the past forty-eight hours had had a dreamlike quality. Maybe he *was* dreaming. Or maybe he had a charmed life. Or something. Though there was nothing dreamlike about the throb in his foot, or the acute soreness in his gluteus maximus.

Soga, being a crocodile, bowed his whole body at every stride. First the head and tail went to the right and the body to he left; then the process was reversed. Which was most unpleasant for his rider.

Cuff was willing to swear that he'd ridden at least fifty miles instead of the fifteen Cukata had mentioned. Actually he had done about thirty, not having been able to follow a straight line and having to steer by stars and, when it rose, the sun. A fair portion of the thirty had been hugging Soga's barrel while the croc's great tail drove them through the water like a racing shell. No hippo or other crocs had bothered them; evidently they knew when they were well off.

Athelstan Cuff slid—almost fell—off, and hobbled up to the entrance of one of the houses. His practiced eye took in the roof cistern, the solar boiler, the steam-electric plant, the batteries, and finally the tube inside. He went in. Yes, by Jove, the tube was in operation after all these years. Hickey must have had something jolly unusual. Cuff found the main switch easily enough and pulled it. All that happened was that the little orange glow in the tube died.

The house was so silent it made Cuff uncomfortable, except for the faint hum of the solar power plant. As he moved about, using the kerry for a crutch, he stirred up the dust which lay six inches deep on the floor. Maybe there were notebooks or something which ought to be collected. There had been, he soon discovered, but the termites had eaten every scrap of paper, and even the imitation-leather covers, leaving only the metal binding rings and their frames. It was the same with the books.

Something white caught his eye. It was paper, lying on a little metal-legged stand that the termites evidently hadn't thought well enough of to climb. He limped toward it eagerly. But it was only a newspaper, *Umlindi we Nyanga* —"The Monthly Watchman"—published in East London. Evidently, Stanley H. Mqhavi had subscribed to it. It crumbled at Cuff's touch.

Oh, well, he thought, can't expect much. We'll run along, and some of the bio-physicist chappies can come in and gather up the scientific apparatus.

He went out, called Soga, and started east. He figured that he could strike the old wagon road somewhere north of

the Mababe, and get down to Mtengeni's main station that way.

WERE those human voices? Cuff shifted uneasily on his Indian fakir's seat. He had gone about four miles after leaving Hickey's scientific station.

They were voices, but not human ones. They belonged to a dozen *'fene abantu,* who came loping through the grass with old Indlovu at their head.

Cuff reached back and thumped Soga's tail. If he could get the croc going all out, he might be able to run away from his late hosts. Soga wasn't as fast as a horse, but he could trot right along. Cuff was relieved to see that they hadn't brought his rifle along. They were armed with kerries and spears, like any of the more savage *abantu.* Perhaps the fear of injuring their pet would make them hesitate to throw things at him. At least he hoped so.

A familiar voice caught up with him in a piercing yell of "Soga!" The croc slackened his pace and tried to turn his head. Cuff whacked him unmercifully. Indlovu's yell came again, followed by a whistle. The croc was now definitely off his stride. Cuff's efforts to keep him headed away from his proper masters resulted in his zigzagging erratically. The contrary directions confused and irritated him. He opened his jaws and hissed. The baboon-men were gaining rapidly.

So, thought Cuff, this is the end. I hate like hell to go out before I've had a chance to write my report. But mustn't show it. Not an Englishman and an officer of the Crown. Wonder what poor Mtengeni'll think.

Something went *whick* past him; a fraction of a second later, the crash of an elephant rifle reached him. A big puff of dust ballooned up in front of the baboon-men. They skittered away from it as if the dust and not the bullet that made it were something deadly. George Mtengeni appeared from behind the nearest patch of thorn scrub, and yelled,

"Hold still there, or me, I'll blow your heads off." If the *'fene abantu* couldn't understand his English, they got his tone.

Cuff thought vaguely, good old George, he could shoot their ears off at that distance, but he has more sense than to kill any of them before he finds out. Cuff slid off Soga and almost fell in a heap.

The warden came up. "What . . . what in the heavens has been happening to you, Mr. Cuff? What are these?" He indicated the baboon-men.

"Joke," giggled Cuff. "Good joke on you, George. Been living in your dashed Park for years, and you never knew— Wait, I've got to explain something to these chaps. I say, Indlovu . . . hell, he doesn't know English. Got to use Xosa. You know Xosa, don't you George?" He giggled again.

"Why, me, I . . . I can follow it. It's much like Zulu. But my God, what happened to the seat of your pants?"

Cuff pointed a wavering finger at Soga's saw-toothed back. "Good old Soga. Should have had a saddle. Dashed outrage, not providing a saddle for His Majesty's representative."

"But you look as if you'd been skinned! Me, I've got to get you to a hospital . . . and what about your foot?"

"T'hell with the foot, 'Nother joke. Can't stand up, can't sit down. Jolly, what? Have to sleep on my stomach. But, Indlovu! I'm sorry I had to run away. I couldn't marry Ingwamza Really. Because . . . because—" Athelstan Cuff swayed and collapsed in a small, ragged pile.

PETER CUFF'S eyes were round. He asked the inevitable small-boy question: "What happened then?"

Athelstan Cuff was stuffing his pipe. "Oh, about what you'd expect. Indlovu was jolly vexed, I can tell you, but he didn't dare do anything with George standing there with the gun. He calmed down later after he understood what I had been driving at, and we became good friends. When he died, Cukata was elected chief in his place. I still get Christmas cards from him."

"Christmas cards from a baboon?"

"Certainly. If I get one next Christmas, I'll show it to you. It's the same card every year. He's an economical fella, and he bought a hundred cards of the same pattern because he could get them at a discount."

"Were you all right?"

"Yes, after a month in the hospital. I still don't know why I didn't get sixteen kinds of blood poisoning. Fool's luck, I suppose."

"But what's that got to do with me being a 'dopted boy?"

"Peter!" Cuff gave the clicks represented in the Bantu languages by *x* and in English by *tsk*. "Isn't it obvious? That tube of Hickey's was on when I approached his house. So I got a full dose of the radiations. Their effect was to produce violent mutations in the germ-plasm. You know what that is, don't you? Well, I never dared have any children of my own after that, for fear they'd turn out to be some sort of monster. That didn't occur to me until afterward. It fair bowled me over, I can tell you, when I did think of it. I went to pieces, rather, and lost my job in South Africa. But now that I have you and your mother, I realize that it wasn't so important after all."

"Father—" Peter hesitated.

"Go on, old man."

"If you'd thought of the rays before you went to the house, would you have been brave enough to go ahead anyway?"

Cuff lit his pipe and looked off at nothing. "I've often wondered about that myself. I'm dashed if I know. I wonder . . . just what would have happened—"

AN ULTIMATUM FROM MARS

By RAY CUMMINGS

AN ULTIMATUM FROM MARS

The Martians had Earth by the throat—for lack of a vital resource! But—Earth found the perfect answer!

By Ray Cummings

Illustrated by Wesso

SECRETARY JAMISON, Anglo-American minister of interplanetary relations, riffled through his sheaf of papers and tossed them to the polished top of the big mahogany table.

"That, gentlemen," he said, "represents officially how our correspondence has progressed with the government of the Martian Union from their first tentative demands of more than four years ago up to their ultimatum of yesterday."

The board room of the interplanetary foreign-relations committee, here in Washington, was silent as the foreign secretary paused and gazed at the assembled committee members who were intently regarding him.

"Ultimatum?" one of the board submembers echoed. "Would you call it that? Not for the newscasters or the public prints, certainly."

"What else could you call it?" Secretary Jamison retorted. "Martian aggression—disguise it any way you like, it's still Martian aggression."

"It's an unprecedented ultimatum of bare-faced impertinence!" exploded Secretary Carruthers, the minister of war. "Do those damnable Martians think they can back the Earth down into subjection, just by rattling their weapons?"

"Exactly that." The thin, seamed face of Jamison was grim with a faint, sardonic smile. "That's what their ultimatum really means, of course." He picked up one of the papers from the table and turned again to the committee submembers.

"Consider this carefully, gentlemen," he added. "Here is the ultimatum. It will go down in history as an important document, and so will our answer to it. I'm going to make them both public at midnight tonight." He read slowly:

"'In the interests of interplanetary peace, his imperial majesty's government at Ferrok-Shahn, in the name of the Martian Union, feels that it is incumbent upon the government of the World Federation of Earth to acquiesce in the formerly discussed plan which his imperial majesty suggested for the establishment of justice in the area previously known as your Central America. In the interests of a permanent interplanetary peace, the government of the Martian Union feels that this is immediately necessary. Therefore, his imperial majesty now must insist upon your affirmative answer within the span of twenty-four Earth-hours in order that peace may be preserved, which now, as always, his imperial majesty fervently desires.'"

"Surrender to us—or we'll make war!" Secretary Carruthers exploded again. "Two hundred years ago, here in America, we had a phrase for that. A bandit would put a gunpowder bullet projector up to your head and he'd say, 'Do what I want, or else—'"

"Well, that's the way it is," Jamison agreed. "And it must go down in history as just that, and nothing more. Gentlemen, as all of you know, from the time the Martian government put its embargo on our importation of *iridite,* we have been helpless. Don't look at me like that, Carruthers. Every man, woman and child that crowd the pedestrian level knows that much. *Iridite*—a catalystic substance without which the atomic engines of our spaceships—our interplanetary ships of war—are inoperative. To say nothing of our economic needs for it, also—an industrial chaos which is already almost upon us. *Iridite,* being radio-active, wears out, you know. Our supply is about gone. We cannot produce it here on Earth; we can no longer secure it from Mars. So, as Set Marrok, the Martian ambassador, was good enough to point out when he called here upon me this morning, we are quite helpless."

IN THE silence as the foreign secretary ceased speaking, the twelve submembers of the board murmured together and stared with a grim numbness.

"Does this mean—surrender?" one of them demanded with blank dismay. "My God, Secretary Jamison, to think that I'd ever live to hear you talk like this—to be summoned here to a conference for Earth's surrender!"

"Why, all that damned ultimatum means," another submember ejaculated, "is that we are to be forced into giving the Martians a foothold here on Earth, which they can use as a base to conquer us further. Why, even under that flimsy pretext of making a Martian minority colony self-governing—"

"Governed by Mars, you mean!" the war secretary interjected. "Sure! That's the ultimatum! And in a few more synodic periods, Mars would think up another pretext 'in the interests of interplanetary peace,' and send an invading army to seize all our Western Hemisphere. Well, what are we going to do about it?"

The explosive war secretary's question was rhetorical. He seemed about to answer it, but Jamison's raised hand checked him. "Just a moment, Carruthers."

"All right," the war secretary agreed vehemently. "Then you go ahead and talk."

"You might dig again into the history of two hundred years ago, Carruthers," the foreign secretary retorted caustically. "You recall that saying, 'Even the walls have ears.'" He lowered his voice as he gazed at the startled group of men. "This room is not insulated against electromagnetic eavesdropping," he added. "And Martian spies are everywhere."

"Not in this building," the personnel manager put in.

"You think not, Douglas? You wouldn't hire a Martian for your staff here, of course. But Martian sympathizers—Earth people who have been bribed—" Jamison lowered his voice still further as he added:

"I have told the Martian ambassador that we have something of considerable economic importance to show him. Something that should greatly interest his government at Ferrok-Shahn. I asked him to present himself tonight at eight o'clock at the Great New York offices of the Anglo-American Co., by whom Mr. Hallen is employed."

It made all the men in the room turn to gaze at a young American who was sitting a little back from the big table—a tall, muscular fellow in his early twenties. Gravely silent, he had been listening with alert gaze to the discussion. His name was Jac Hallen—a youthful, but important, member of the company which Jamison had mentioned.

"The Martian ambassador will call upon you at eight o'clock tonight, Mr. Hallen," the foreign secretary added ab-

ruptly. "Will you be ready for him?"

"I'll be ready for him," Hallen answered grimly. "Is he coming alone?"

"Yes." Jamison nodded. "I believe so. I have ordered two of the members of our Japanese delegation to be with you." The foreign secretary smiled faintly. "I have personally selected them from my Washington staff. Both are completely trustworthy. And exceedingly clever, in typically Oriental fashion. They are Mr. James Sukiyama and Mr. Wan Toy. Do you know them, Hallen?"

"No, sir. I don't believe I do."

"Both are very proud of being Anglicized." the foreign secretary added. "They've lived here in Washington for years. But despite it, they are Oriental to their fingertips. Ideal for our purpose. You understand me, Hallen?"

Young Hallen nodded. "Yes, sir, I do."

"Your interview with the Martian ambassador will be wholly in English."

"Yes, sir, I understand. I'll discuss the thing fully in advance with Mr. Sukiyama and Mr. Toy." And Hallen added grimly, "We'll take care of that Martian."

THE HUGE group of buildings which housed the Anglo-American Co. lay bathed in the autumn moonlight. To one side, down a ramp hill of terraced levels, beyond the maze of public landing stages, the outskirts of the vast city of Great New York rose in serrated tiers to the south. The glare of its neolights made the cloud banks overhead a giant pallette rioting with color—a reflected sheen which dimmed the moonlight on the roofs of the nearby buildings.

To one side of the heterogeneous group of structures—all of them dark and brooding at eight o'clock in the evening—was a single large rectangular building, one story high. It was not dark like the others; its long rows of big glassite windows glowed with the sheen of its interior lights. At a secluded northen corner in the small vaulted office, Jac Hallen sat at his desk, with his shirt sleeves rolled up, baring muscular forearms, and a big black cigar between his teeth.

"You gentlemen get the idea?" he was saying grimly.

"Quite so," said Mr. Sukiyama.

"Indeed yes," Mr. Toy agreed.

If young Hallen desired to make this conference with the shifty, disingenuous Martian ambassador wholly unofficial and informal, the aspect of the little Japanese delegates was hardly in keeping. Both were impeccably garbed in full evening regalia. Like little puppets, identical in dress and manner, they sat stiffly upright, side by side, with their shiny hats and white gloves on their knees.

On Hallen's desk a buzzer sounded. His grid lighted with the tiny image of his assistant, big, red-headed Joe McCarthy, who was in the adjoining office.

"Man named Marrok wants to see you," McCarthy said.

"Send him in," Hallen ordered. He tilted back his chair, a blue cloud of smoke rising as he puffed at his cigar. The little Oriental delegates got silently to their feet, standing stiffly erect, side by side. Hallen's eyes were gleaming, his jaw belligerently set. But the impassive brown faces and the blank dark eyes of Mr. Sukiyama and Mr. Toy yielded nothing.

The door opened and the Martian ambassador came striding in. He was a big fellow, this Set Marrok; by Earth standards, a tremendous brawny giant. Not spindly, like most Martians; for all his seven feet of height he was almost heavy-set. From his massive shoulders a gray Martian traveling cape hung down in voluminous folds. He stripped it off as he swaggered into the office, revealing a plaited leather jerkin and knee pants of decorated leather out of

which his lower legs showed as gray, hairy pillars of strength.

Young Hallen was on his feet now, smiling faintly. "Good evening to you, Set Marrok."

"Good evening," the Martian said. "I am here at your insistence." He said it with the inference that his visit was a gracious gesture of no importance either to himself or his government. His voice had the heavy, throaty rasp characteristic of all Martians, but his English was perfect, with the clipped Martian accent worn almost away by his many years of residence in Washington.

"I'm glad you came," Hallen said. "You perhaps have met Mr. Sukiyama and Mr. Toy, our Washington delegates from Japan?"

The Martian nodded briefly.

"Oh, yes," Mr. Sukiyama said. "Thank you very much."

"It is always a great honor to meet his distinguished excellency from Mars," Mr. Toy agreed.

Marrok's sword ornament clanked against his metallic shoes as he took the chair Hallen offered. "My time is short," he said.

"We'll bear that in mind," Hallen agreed.

"You have something to show me?"

"Yes. It seems of considerable economic importance, Set Marrok. Your government, I'm sure, would be interested."

"My government is interested only in the fate of our poor, oppressed people here on your Earth," the big Martian said smoothly. "Disorders have broken out—my people have been killed by your terroristic provincial government. It is a situation, a condition which his imperial majesty of the Martian Union can no longer tolerate. In the interests of interplanetary peace—"

"The honorable Martians desire interplanetary peace so greatly," Mr. Sukiyama murmured sympathetically.

SET MARROK flung the little Japanese a darkling glance. "As set forth in our note of yesterday—"

"Your ultimatum," Hallen stated.

"No such construction of our most reasonable request is permissible," the Martian disclaimed. "When the peace of the starways is threatened, we must act."

"Your ultimatum," Hallen persisted, "requires our answer by midnight tonight. You are familiar with our Earth's political history, Set Marrok? You have heard of the Monroe Doctrine?"

The big Martian stared. Mr. Sukiyama murmured:

"The honorable Monroe Doctrine was mos' respected by my illustrious Japanese people for two hundred years."

"It was a sacred principle of the great American nation which dominated this hemisphere for more than two centuries," Hallen added. "And when the World Federation was established, it was extended to include the entire Earth." Hallen's voice turned crisp. "Do you think now that we want a Martian-ruled colony established on Earth? We could never submit to that, Marrok."

The Martian stiffened. "Am I to construe this as an indication that your government is going to defy our request?" he demanded. His gray face flushed a little with his rising anger.

"Yes," Hallen said abruptly.

"So sorry," said Mr. Toy.

"You're crazy," Marrok retorted. "Without *iridite* you're helpless and you know it."

"Unfortunately yes," Mr. Sukiyama murmured.

"So sorry about that," Mr. Toy said regretfully.

"You're fools—crazy, damn fools!" Marrok suddenly exploded. "Why, if you dare to—"

"Defy your threats?" Hallen prompted. "We can talk plainly, Mar-

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rok. This is an informal visit—not diplomacy, you know. If we dare to defy you—"

"We will smash you with our invasion from pole to pole," Marrok rasped.

"In the interests of interplanetary peace?" Hallen suggested.

"Which so fervently the honorable Martians desire," Mr. Sukiyama put in.

The Martian ambassador waved it away. "Don't be a fool, Hallen." He clanked his sword ornament with a ringing thump against the metal of his shoes. "If you have any influence with your government, you had better make them realize that the might of Mars cannot be held in check. Our destiny of interplanetary conquest must be fulfilled."

"And you won't stop until you own the Earth?" Hallen retorted. "Aren't you forgetting your little minority in our Central America? That situation so intolerable to you?"

"Don't be a nitwit." The Martian grinned. "The Earth is helpless, no matter what we choose to do—that's the real fact. And still you think you dare defy us?"

"So terribly sorry," Mr. Toy murmured.

"Regretfully necessary to defy you," Mr. Sukiyama acknowledged gently. "Unfortunately, yes."

The big Martian's irritation suddenly boiled completely over. He jumped to his feet. "You're just damned fools," he roared. "This gives us our opportunity. For six of your Earth-years, now, we've prepared for it—this chance to conquer you—"

"Exactly." Hallen's quiet voice cut through the Martian's roar. He, too, was on his feet and he was grimly smiling. "The people of Earth are glad to have your version of Martian aggression. The real voice of Mars—with this prating of interplanetary peace discarded."

Hallen had pressed a button on his desk. The office door opened, with the big, red-headed Joe McCarthy looming there, silhouetted by the blue-green glare of the laboratory behind him. In the silence there was a hissing, throbbing sound, like water escaping from a pipe under tremendous pressure.

"Ready now?" McCarthy said. "Shall I shut off the senders?"

"No, not yet," Hallen said crisply. "Quite the opposite. I buzzed you to be sure they remained in operation. Our Martian friend, here, at last is talking like a Martian. As Secretary Jamison said, it must go down in history—the real aggression of Mars understood so that future Earth generations can guard against it."

"You . . . you would dare to quote me?" Marrok's big jaw dropped. "Why, you damned—"

"So sorry to displease," Mr. Toy murmured.

"Quote you?" Hallen echoed. "This is an informal visit—not diplomacy, just man-to-man talk. Quote you? Why, we've been on the air ever since you entered here! All over the Earth millions upon millions of our people, right now, are hanging upon your words. Martian aggression—they understand it now."

"Regretfully to annoy you," Mr. Sukiyama apologized.

FOR A MOMENT the big, swaggering Martian was stricken with angry astonishment. Then he recovered himself. "All right," he roared, "then you can broadcast this and be damned to you. At the end of the next synodic period—in thirty of your Earth-days—Mars will be within sixty millions miles of here. The Martian armada is mobilized and ready. From well beyond your stratosphere we'll bombard you. Millions of your women and children will be killed. That's Martian aggression! You damned fools—you can't get any *iridite* for your atomic guns. You won't be able to fire a shot in defense.

You can't get any *iridite* here on Earth and—"

"Quite correct," Hallen agreed.

"And you can't get it from Mars—and still you are idiotic enough to think you can defy us?"

"Regretfully true," Mr. Sukiyama agreed.

The big Martian's face was darkly red with his anger, but his eyes gleamed with triumph. "Then here's another message for your people, and there need be no secret about it: My imperial leader will never stop now until this planet is drenched crimson with your blood and you are all his slaves."

"On your way out," Hallen said, "take a look into the laboratory a moment. I want to show you that discovery of great economic importance, as I promised."

At the interior doorway, the big Martian stood gazing. In a blue-green electronic glare the big room, humming with a bustling activity, was only a dazzling blur in which goggled workmen swiftly moved, intent upon their tasks.

"Put on these goggles," Hallen said. "You'll see better, Set Marrok. Surely your aggressive government will be interested in this."

With the goggles the scene steadied and clarified so that the swaggering Martian could see much better. It was an astonishing scene indeed. From empty space in the center of the big room, where a convergence of electronic beams made a patch of riotous color, a jet of metal was extruding. Out of nothingness, it shot forward, molded by its passage through a steel jacket to be a gleaming rod. Like water under pressure from a pipe, it shot over long steel rollers to where, a hundred feet away, a series of steel knives smoothly slid up and down, cutting it into ten-foot lengths. And other machinery was lifting the ten-foot bars, stacking them into great, gleaming piles.

"Iridite!" the Martian gasped. "Good God!"

"Iridite, just so," Hallen said. "More *iridite* than there is, or ever was, or ever will be, on Mars. We had none to be found here on Earth. Quite true, Marrok. But if your scientists haven't investigated the realms of the fourth dimension—well, we have. And it seems that the realm coexistent with the space of this laboratory is very rich indeed in pure *iridite.* Once we were able to release it—well, it extrudes with an amazing profligacy, as you observe. And it has another great advantage, Marrok.

"We bring it out already molded into the shapes we need," Hallen was saying. "For our industrial engines—but just now, as a matter of fact, we're concentrating on spaceships—vessels of interplanetary war—and their long-range guns. Defense guns, yes. But most of all—just between you and me, Marrok—our government is interested in the super-range guns of aggression."

The big Martian ambassador had seen enough. With an oath he tossed away the amber glassite goggles. At the laboratory's outer doorway, Hallen said:

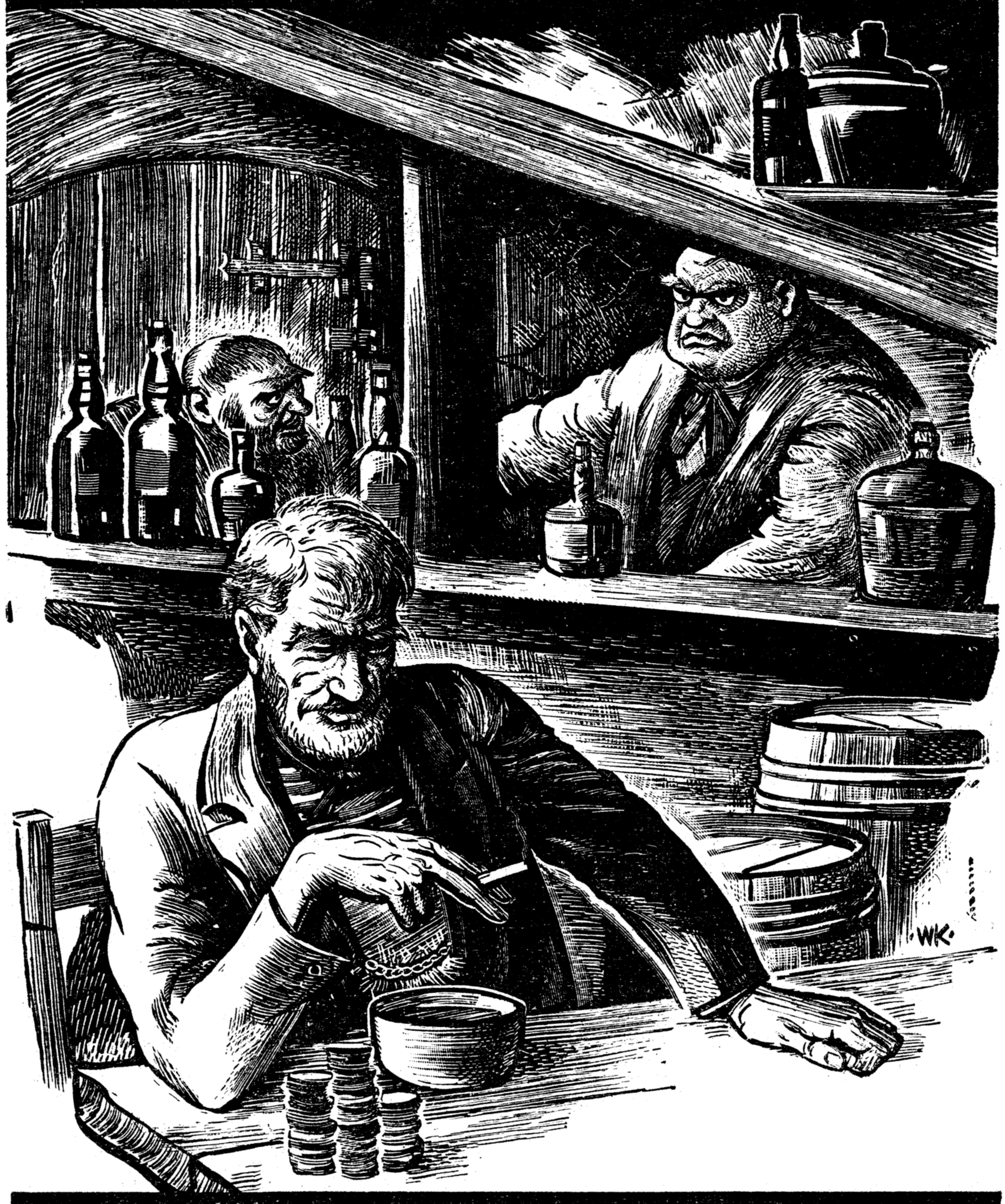
"Good night, Set Marrok. It might be a good idea for you to take a flight back to Ferrok-Shahn and tell your government just what you've seen here. Now that our people have heard you broadcast, they know what Martian aggression really means. That was our purpose in bringing you here. Public opinion, now, will be solidly with us if we start some aggression of our own. So that's our answer to your ultimatum, Set Marrok."

As the speechless Martian ambassador strode down the metal incline from the laboratory doorway two little voices floated after him, suave with apology.

"Unfortunate to disappoint you," said Mr. Sukiyama.

"So sorry," Mr. Toy agreed.

PLEASURE TROVE



By P. SCHUYLER MILLER

PLEASURE TROVE

Under a red sun of another stellar system, two men seek a red dust—the dust of pleasure!

By P. Schuyler Miller

Illustrated by Koll

THE old man in the corner booth had been sitting there since the place opened, at sundown. He was a typical space-rat—one of the breed who got their feet off the Earth in the days of the first hydrox ships and never went back for longer than it took to draw their pay and get it spent. He was little and scrawny, bronzed to the color of an old boot, with white stubble bristling on his weather-beaten chin. There was a stack of gold pieces on the table in front of him, and a heap of silver and copper from which he pulled a coin when the waiter brought him another bowl of the sirupy green *brllya* that he had been sipping for the past three hours.

He was just another space-rat, in a dive where scores like him were doing their best to drink and gamble the rank taste of Sheol's black fogs and the stench of its port of Abaddon out of their brains. He sat in his corner, hunched over his bowl of *brllya,* sipping and staring with blank eyes at the bare wall opposite him. He bothered nobody, and nobody bothered him. But from behind the bar two button-eyes, half buried in rolls of yellow fat, were watching him with interest.

Those mud-colored eyes had seen plenty since Joe Sligo first saw the black ball of Sheol swimming outside the port of a tramp freighter. Abaddon was a huddle of sheet-iron shacks then, and he had made it a city. Other enterprising individuals had showed up from time to time with a stake and a few new women, but their flashy tin-and-tinsel joints lasted for a month or a year and then faded out. Sligo's place was the same dirty hole in the wall that it had been ten years before, when its previous owner was found face down in the mud with his throat cut and no heirs. And it was still the unofficial capital of Sheol.

Joe Sligo saw plenty from his stool behind the bar. What he saw he had ways of using. Right now he was watching the old man in the corner, seeing the waxen polish of his bronzed cheeks, and the rosy flush in the lobes of his withered ears. He saw the massive gold watch that the old space-rat fondled so lovingly, and the fine scarlet dust that had spilled on the table.

Joe saw these things, and the brain behind his little eyes turned them over and over and decided what should come of them. He shifted his weight on the creaking stool and beckoned to the lantern-jawed barkeeper. Across the smoke-fogged room the outer door opened and closed. His eyes flicked automatically to the pair who had come in; saw them and narrowed.

Ape Brennan was close to fifty. He was black Irish of Earth—short, hard, massive of bone and muscle, hairy as a black he-goat. The hollow socket of the eye he had lost in a back-room

mêlée on Mars was as red as the surviving orb that he cast belligerently over the crowded room as he swaggered to the bar. His coat was buttoned tight over his barrel chest, his huge paws crammed into the pockets of tight, checkered pants.

Hunt Martin was tall and lean and younger than Brennan by a good twenty years. He was blond to the point of whiteness, his space-burned face clean-shaven, his pale eyes disarmingly innocent under their straw-colored lashes. Those eyes were beginning to be bloodshot, and he swayed a little as he walked.

The two men stood with their backs to the bar, surveying the room. Martin had flung down his tumbler of white whiskey in one swift motion, and Brennan was nursing his in one big hand. His good eye traveled slowly around the room and found the lone figure in the corner booth. His elbow dug into Martin's ribs. Still holding his drink, he started across the floor, the younger man at his shoulder. Behind them the barkeeper began slowly to untie his grimy apron as Joe Sligo slid down from his stool and waddled through the door that led into his private office.

THE OLD space-rat did not look up as the two men approached. Close up, the waxen skin and rosy lobes of the *snitt* addict were plain. Ape Brennan edged onto the bench beside him, his broad shoulders pushing the old man over against the wall. Martin slid into the seat opposite and set his empty tumbler down on the table with a click. Brennan drained his glass and beckoned to the waiter.

"What'll it be, mate?" he inquired expansively. *"Brllya?* Hell—try a man's drink. *Spodlak* all round, and bring the bottle."

The old eyes focused blearily; the dried-up old fingers fumbled nervously with the watch, tucking it into a shirt pocket. The oldster's voice was muzzy with drink.

"I know you!" he quavered. "Ape Brennan! Shipped with you on the *Corvus!* I was slops an' you . . . you was in the hot gang. Best damn valve man they had, only you was always beefin' about the grub. Felt like slappin' you down, I did . . . slappin' you down in your tracks! He, he, he!" The old man rocked with laughter. "Me . . . slap you down!"

"Sure!" Brennan's face split in a wolfish grin and his arm landed with a thud on the man's thin shoulders. "We was pals then, and we're still pals. All three of us—you and me and Hunt Martin here. Hunt's still wet behind the ears, but he's real promisin' for his age. We been lookin' for you ever since we heard you was in Abaddon. What you been doin' for yourself since I gave your filthy cookin' the slip back on Tantalus?"

The old man's face went crafty, and his eyes darted suspiciously around the room. He stiffened at the sight of the waiter, standing at Brennan's elbow with a tray of drinks. Martin reached for the bottle and filled the three chipped beakers as the big man flipped a silver disk at the man who had brought them.

"Scud!" he growled. "We're old friends, see, and we don't want to be bothered."

Martin's drink went down in one long swallow, and he poured another and set it down in front of him. His pale eyes were on the waxen face opposite him, on the massive watch that had come out of its pocket and was swinging back and forth on the end of its chain. The old man sensed his stare and his eyes glittered peevishly.

"Who's he?" he demanded. "I ain't talkin' to strangers."

Brennan guffawed. "Him? He's all right. He's our pal—yours and mine. Hell—everyone knows Hunt Martin!" He clinked his tumbler against the old

man's untouched glass. "C'mon—slop it down and I'll pour you another one."

The old rat sipped slowly, his eyes fixed on vacancy, his fingers playing with the little stack of gold in front of him. "I been doin' fine since we was on the *Corvus,*" he said huskily. "Horny—you remember Horny, don't you—he put me onto somethin' after a jet blew an' took his legs off. That was right after you jumped ship on the Tantalus run." He stopped and Brennan refilled his partly emptied glass, then his own. Martin tossed down what was left of his drink and held out his beaker.

"Halfway," he said thickly. "I'm seeing threes again."

Brennan gave him three fingers of the shimmering stuff and set the bottle down within reach. The old man was staring into thin air, his eyes darting back and forth like trapped mice.

"Horny was older 'an I am," he muttered. "He was on the first ship 'at raised Sheol. He was in the gang that found *snitt*—an' he knew where to find it again. Not the stuff the damn natives sell you—half *spod* gum—the real thing. He made a map, an' then he never went back." The crafty look was back on his lined old face. *"Snitt!"* It was almost a whisper. "Heaps of it, like red sugar—an' the little yellow devils wallowin' in it an' whisperin' to it in the dark. *Snitt*—like sand, drifted against the glass—and . . . I . . . got . . . that . . . map!"

His hand jerked out, knocking over the tumbler of *spodlak*. His thumb had been hooked under the watch chain, and the heavy gold case whacked down on the table and popped open. Red dust poured out—*snitt*—fine gems of ruby fire that were the reason why Abaddon was a port of space—the drug that brought utter, ecstatic pleasure, that put body in dreams, that made poets out of valvers and queens out of dance-hall girls. With the patrol cracking down on every known source of the stuff, there was enough in that little heap to bring ten times the gold in the old man's stack. There were three withered leaves, mixed into the ruby dust—tiny and round, like a man's thumbnail, with a queer ladder pattern of silvery veins. There was a square of folded, tattered paper.

Hunt Martin's hand shot out and took the bottle by the neck. He reared unsteadily to his feet and shook his flaxen head. "Ape!" he shouted. "Hookers! Let's take 'em!"

BRENNAN swung round. Martin stood straddle-legged, leering belligerently at a ring of uniformed men. Behind them, Joe Sligo's yellow face hung like a Cheshire grin, the lean barkeeper and three hulking waiters at his shoulder. Hookers—port police—seining Abaddon's dives for men who could be slugged and bundled aboard some tin-hulled derelict of space whose crew had jumped ship, and whose captain knew whose palm to grease.

His hand went into his shirt for the gun he carried there. As it came out Martin let fly. The bottle took the foremost hooker between the eyes, spilling blood and pale-gold *spodlak* down his braided tunic. Brennan ducked for cover as a rain of slugs rattled against the wall. He jammed the gun back in its holster, grabbed the table in his two hands, and swung it before him for a shield. At his feet the old space-rat slid into a bony heap, blood trickling across his wrinkled cheek.

Martin was still on his feet, miraculously unhurt. His gun was in his hand, and as Brennan raised the table he stepped behind it and blazed blindly into the faces of the approaching men. He was laughing—the gleeful, nasty laugh that meant he was blind drunk and mean as hell. Brennan knew it, and without dropping the table he hooked one brawny arm over the tow-

head's neck and yanked him back through the curtains he had spotted just beyond the booth.

A door splintered open behind him; the table jammed and he left it there to block pursuit. Men sprang cursing to their feet and a woman began to scream as Brennan slung the half-choked Martin over his shoulder and raced for the archway that led into Sligo's sanctum. In the door he stopped short.

Sligo was behind a low, black desk with a squat box in front of him. It had a round quartz eye that was staring straight at Brennan. Ape's one red eye stared back, and he let Martin slide slowly to the floor.

"Smart, hey?" he whispered.

Sligo grinned nastily. "Sure. I have to be. And now—will you give me the map you took from old Sleazy?"

Brennan's gaze never left the pudgy hand that rested on the ray machine. One flick of those fat fingers could blast him into eternity, but it would blast the map with him—for Joe Sligo's button eyes had missed nothing. As he swung at Martin's shout his fingers had brushed the little pile of red dust and scissored on the scrap of dirty paper that lay under it.

"You're bugs," he snarled. "I got no map. It's back there—on the old guy. One of your hookers has got it by now."

Sligo's greasy smile was a little less bland, a little less patient. "You have it," he stated silkily. "You are going to give it to me, at once, and then we shall see what is to be done about you and your friend there."

Brennan's eye darted over the room. If Sligo had anyone else here, he was well hidden. Probably he was handling it himself. Joe Sligo was no man to split a pot as big as this one.

"All right," he growled, "I got it. I'm keepin' it. If you burn me, you burn the map, and if you call anyone in to take it off me you'll have to split the take. Maybe we ought to talk a little, first."

HE sidled away from the door and from Martin. He wasn't risking anyone nicking him from behind—and he'd felt something stirring at his feet. Sligo's muddy little eyes were hard.

"Stop!" he snapped. "I'll do the talking. At this range I can burn your head off without singeing your collar, and if you're wise you'll do as I say."

Brennan grinned. If he kept moving, Sligo would have to keep changing his focus or risk losing the map. He might be able to draw his beam as fine as he said, but it wasn't as simple as it sounded. Ape fumbled in the pocket of his checkered vest and drew out the scrap of paper he had taken from the old man, holding it like a shield in front of his midriff. He scanned the pattern of penciled lines sketched on it. He could memorize that pattern, but not in the time he had.

"I'm a magician, Sligo," he grinned. "I can make this piece of paper disappear where you won't ever find it—and I can bring it back again. Watch."

He took two quick steps forward and to the left. There was a window behind the desk, and it was open. He could see the thick curtains swaying and smell the dank rot of Abaddon's back streets. With the exaggerated gestures of a sideshow conjurer he swung his long arms up, both palms spread wide, the map folded between his fingers. Sligo's little eyes followed every motion.

"There's nothin' up my sleeves," he announced. "I'd roll 'em up for you, only I don't think you'd let me. When I say the word, you'll get the surprise of your bloody life—and that map'll be where you won't ever see it. Are you ready? Now!"

Martin's gun barked from the floor. Nice work! The lens of the heat ray splintered; blue flame spat from its shat-

"There's your answer," he grunted. "Those things—they eat glass!"

tered tubes. With a leap Brennan was across the desk, both hands at Sligo's fat throat, hammering the man's bullet head against the wall. He flung the fat man from him, caught up the heavy chair beside the desk, and hurled it through the curtains.

"Come on!" he shouted and leaped after it.

Beside him Martin landed, skidded, and came down flat in the mud; scrambled cursing to his feet and was racing after him toward the gleam of a street light on Abaddon's one paved and policed thoroughfare. They turned the corner and drew up circumspectly behind a figure in the silver and black of the patrol. None of Joe Sligo's hand-

fed hookers here! The patrol and the local police hated each other like cats and dogs.

Martin's knees wabbled a little as they sauntered past the patrolman. Liquor got him pretty quickly, and Brennan's loving grip on his throat had left his ears buzzing.

"G'evening, officer," he observed thickly. "R'member me to Terra when you see her."

The patrolman grinned. These space-hogs were a tough lot, but space wouldn't be space without them. The big fellow looked like Ape Brennan, and there was no better mechanic alive when he wanted to work. Men like him were the life of the rocket fleet, and had been since the days when they had to sit astride the feed valve of the old hydrox ships and nurse them through space with one eye on the firing chart and the other on the pyrometer. Sure, he'd remember them to Terra—if he ever saw her again himself.

SHEOL'S black fog lay low over Sheol's lava mountains, dripping from every splintery crag and gurgling in every crevice in the rock. Somewhere up there was Sirius, the Dog Star of Earthly mariners, and some time during what passed for day on this hellish planet it might burn through and give enough light to see by.

Plodding through the steaming murk, crude packs strapped to their backs, Ape Brennan and Hunt Martin cursed Sheol and everything on its moldering surface, including each other. Space-hogs chart their courses by the stars, out where there is room for a man to stretch. This business of groping step by step along a dubious trail through a howling wilderness of cluttered rock and tangled vegetation was not their idea of pleasure.

Martin had the map, because he'd been training for an engineer before he got plastered at a fraternity brawl, beat hell out of a couple of chaperons and the campus cop, and got busted out of all colleges for all time. He had made a clean copy of the tattered tracing, and he was pretty sure they were still on the right trail. This part of Sheol was a desolate waste, barren and wind-whipped, where nothing lived, and it stood to reason that whatever was hidden here would have stayed that way.

They were in a gorge between columned basalt cliffs, where the perpetual winds of these latitudes gathered into a continual blast that howled among the fretted rocks and pounded at their bent backs with ever-increasing fury. They were high, and climbing higher, but the landmarks that the old space-hog had scrawled on his scrap of paper were there in front of them, plainer than at any time before in this damned goose chase. The twin pylons that marked the mouth of the gorge—the zigzag crevice where the gulch forked—and now the flight of giant steps that climbed before them to the summit of the mountain wall.

Martin studied those steps. There had to be some way up them, but the old-timer hadn't shown it. The wind raked them unmercifully, blasting them with débris from the floor of the gorge. At the top they split into two cloud-climbing stairways, separated by a notch through which spilled a fan of bluish light—sunlight, or what passed for it on these God-forsaken worlds under Sirius' blue-white glare.

Unless he missed his guess completely, that notch was their goal.

They spent the night at the foot of the basalt stair. They had a tent that sheltered them a little from the wind, and food in cans, and insipid water from a cloud drip on the cliff. They lay back to back, shivering with cold, and when it grew light enough to see their feet they started up.

There was a way. It meant angling back and forth across slippery rocks,

leaping from column to broken column, hitching up cracks and cat-footing along ten-inch ledges that dwindled to six, with the wind plastering them against the black rock, but they found it. It brought them to the notch in the rock wall, and out into the crater beyond.

Wind roared into it through the gap and funneled up, tearing a hole in the cloud roof, letting in the light. The two men stood blinking; then, as their eyes became accommodated to the glare, they stared at the scene before them. A bowl in the black rock, floored with purplish sand, ribbed with columns and iridescent knife-blade spurs of volcanic rock. An acre or two—no more—but carpeted with waist-high scrub, growing in a tangled mass over every available inch of the crater floor. *Snitt!*

BRENNAN was already halfway down the rubble slope. The place was deathly quiet, save for the drone of the wind overhead. Martin's brow wrinkled. If this was the main source of Sheol's devilish drug, there should be more evidence of the natives who garnered it. There had been none, anywhere on the in trail, and as far as he could see they had found the only entrance to the place. Was it a new source—something not even the natives knew about? If so, its value mounted by leaps and bounds.

He dropped his pack by Brennan's, at the foot of the slope, and followed him down to the edge of the scrub. It was different from Sheol's ordinary plant life—it was green, and it apparently depended on light instead of leading the parasitic existence of other Sheolian plants. That clinched it; it wasn't likely there would be two places where the topography allowed the winds to rip a perpetual skylight in the cloud roof. There should be evidence of the natives, and there wasn't. He didn't like it.

Ape Brennan had his hands full of leaves. They were small, malachite-green—round like a man's thumbnail—with ladders of silver veins traced on their backs. The stalks of the plants were thick and ribbed, scarred with little semicircular notches, and from the broken twigs oozed a gummy purple sap that hardened as the air hit it.

Brennan dropped the leaves, smeared his forefinger with the purple gum, and popped it into his mouth. *Snitt* was absorbed by any of the mucous membranes, and many hopheads sniffed it or inhaled the vapor. Ape was industriously rubbing the stuff under his long upper lip and around his gums. He stood for a moment with a beaming smile of anticipation on his ugly face, then that beatific look changed to a stare of horror. Tears came to his eye and he clapped both hands over his mouth and began to hop around like a jumping bean.

"Wow!" he bellowed. "Oooh . . . ow! I'm burnin'! Quick . . . gimme water!"

Martin leaped for the packs. Their canteens were empty, but he had a bottle of whiskey that he'd been saving for the big celebration when they cashed in. He smashed the neck on a rock and handed the bottle to Ape, who took a huge mouthful of the potent stuff, swilled it around, and spat it out. The white distillate of Abaddon's peculiar fruits was tinted a bright violet. As Brennan tilted the bottle again, Martin grabbed his arm. It was all they had. His pale eyes blazed.

"Give me that!" he yelled. "Half that stuff's mine."

Ape gave. Martin's arm jerked back and his elbow crashed numbingly into a rock. The two men stared in horror at the pile of shattered glass at their feet, at the stain of liquid fast seeping into the sand. Miles from a bar, and nothing to drink but fog water!

Martin let himself slump to the ground. Brennan sat down beside him, nursing his swelling face.

"We been had!" he complained bitterly. "This stuff ain't *snitt*. Hell—it's like lickin' fire! The old bugger was nuts."

Martin shook his head. "I don't think so," he said thoughtfully. "Someone came here and made a map. Those leaves are what we saw with the other stuff in that watch case—and there was enough *snitt* there to last a year. No—we've missed something." He pointed at the plants. "Look at those cuts on the stems. Someone's done that to bleed them for gum, like they do trees back on Terra, but there's no other sign that anyone has ever been here. Nobody can cover a trail that well. I just can't figure it."

Brennan's good eye lit up. "Look," he said hopefully, "mebbe you're right. I remember about them trees back home. Mebbe we got the wrong season or somethin'. Mebbe some other time the stuff turns red and it's all right."

Hunt Martin's stare was still gloomy. "They don't have any seasons on this damned planet," he complained. "Unless"—his face brightened and he squinted up at the circle of cloudless sky—"that gap closes periodically and shuts the light off. That might do it." He sprang to his feet and dealt Brennan a mighty wallop on the back. "Ape, you've got something there. Let's make camp and take a look around."

IT WAS night when they returned from their tour of the crater, and fat, bright stars were burning down through the cloud window above them. The gap where they had come in was the only break in the sheer basalt walls of the place, and there was no evidence that anything bigger than a rat had ever been near the place. Queer little paths in the sand under the plants were apparently animal trails of some kind, but they were far from the splayfooted paw marks of Sheol's slab-sided natives.

Martin didn't sleep much. He had a feeling they were being watched. Two or three times during the night he got up and peered out through the tent flaps at the acres of silvery leaves, gleaming palely in the starlight, and cocked his head to listen, but there was only the perpetual drone of the winds far above, like distant surf. He'd give a lot to see surf again, pounding itself to snowy atoms on a curve of white sand, with fringing palms and golden-skinned, slim-legged girls laughing in the sun. Warm, yellow sun of Earth—not the ghastly blue glare of the Dog Star.

He was up before it was light. Brennan was still snoring on his side of the tent, and Martin resisted a temptation to kick him in the ribs. Ape's face was puffed and white from the stuff he'd taken, but it looked better than it had the night before.

They needed water, and besides, he wanted another look around from the top of the notch. It wasn't Joe Sligo's way to give up so easily, as they'd found out a couple of times before they got out of Abaddon, and they might have been followed.

The gorge was empty, as far as he could see before the mists shut down over the lowlands. He filled their canteens at a cloud drip and started back over the shifting talus. Halfway down he heard Ape yell.

Brennan was on his knees by the rock where he had broken the whiskey bottle. He had a cup and was scooping something up out of the sand. As Martin came charging down the slope, he lumbered to his feet and waved the cup triumphantly aloft.

"*Snitt!*" he shouted. "The real stuff! We're rich!"

Martin took the cup. It was half full of the tiny red grains of crystallized gum that men paid with their lives to get. There was twice as much as the old man at Sligo's place had had. He

poked at it with his finger. Little sparkling granules were mixed with it.

"Where'd you find it?" he demanded.

Ape pointed. "There—where you busted the bottle. The glass is all cut up in little crumbs, and most of it's gone. There was a pile of *snitt* there instead."

Martin got down on his hands and knees and peered at the patch of sand. A few crumbled fragments were all that was left of the glass, but the paper label was there. A sudden thought came to him, and he went over to the place where he had knocked the neck off the bottle. The cork was there, and more paper from the seal, and beside them another little pile of scarlet dust.

He saw more than that. Here, higher on the slope, the sand had not been disturbed. There were tracks in it, little, scuffling claw marks that went down through the rocks and joined the nearest animal trail. On a hunch he stooped over and bent aside the drooping branches of the nearest plant. There were fresh notches on its stems from which wet, purple gum was oozing.

There was a peculiar glint in his eyes as he straightened his back. Brennan was industriously panning his cup of joy to separate the grains of *snitt* from the sand and glass he had scooped up with them. The younger man held out his hand.

"Give me that," he said flatly. "You're not going on any *snitt* bat until we get this thing settled and know where we are. If there's that much, there's more, and I'm going to find out where. We can't do it if you're all hopped to hell and floating around on a pink cloud with a harem of fat blondes."

Brennan's face fell. "Geez, Hunt," he protested, "I was only gonna take a little rub. It's been three months since I had me a dream. Anyway, the blondes I get ain't fat!" His lone eye took on a far-away look. "Last time there was three of 'em—young ones—singin' and

Sligo and a troupe of natives! Martin knew that Sligo wasn't going to let him out of this cavern with the knowledge he possessed if it could be prevented.

playin' on some kind of guitars. Geez —that was a dream!"

Martin grinned. "There'll be plenty more," he said. "I'll sift this stuff out and put it in a safe place for you. I have a hunch you'll get all you can ever use before we're through. I have another hunch, too, that it won't be long before we know. Maybe tonight."

HE HAD the same smirk on his thin face at the end of the day when he sat,

with Brennan beside him, on top of the big rock where they had found the *snitt*. All the available glass they could lay their hands on was smashed into bits at their feet, and both men carried flashlights. The night was cold, and Ape Brennan's brow was wrinkled as he sat shivering beside his silent companion. It was beyond him what Hunt was expecting, but as long as it led him to the *snitt* he craved it was good with him.

It was cold, and dark, and quiet as the grave, sitting there in the starlight. Martin fumbled for a cigarette and thought better of it. He lay back on the rock and stared up at the sky. Up there was Earth—Terra—billions and trillions of miles away. The light from it had started toward him years ago—how many he couldn't remember—maybe while he was still making the motions of getting an education. Maybe he could look at it with one of these super-electronic telescopes and see himself walking around, going to classes like any other sap. Maybe—

He realized that there was a new sound, besides the wind and Ape's heavy breathing. He held his own breath and listened. He remembered now—he'd heard it the night before, without realizing it. A rustling—the brushing together of countless tiny grains of sand—the movement of tiny feet. He snapped his light down over the edge of the rock. Beside him, Brennan's breath whooshed out in surprise: *"Geez!"*

Half the glass was gone. There was a little heap of red dust beside it. Something moved in the light of the torch—rat-sized, shining black with a splotch of lighter color. It scuttled away into the shadows.

Martin landed on his feet beside the boulder. His light stabbed down the lanes of plants. There were other shapes there, scampering along the little paths. There was one clinging with crooked legs to a plant stem, sickle-shaped mandibles gashing it, a hooked proboscis lapping up the purple sap. His hand

swooped and caught it, and it struggled violently, setting up a shrill, rasping squeal. He dropped it and it darted away into the vegetation.

Brennan peered at him eagerly. "Bugs, huh? What do they do? Where do they get the stuff?"

"We're going to find out, if I haven't scared them." Martin slung a pack on his back. "They hole up somewhere during the day. If it's out there in the plants, we'll have to wait until daylight and follow their trails, but if it's up in the rocks somewhere, we've got to trail them now, while they're out and busy. You go around that way, and I'll take this side. If you see 'em, yell, and I'll come over."

IT WAS harder than it sounded, tripping over broken rock and sliding in shifting sand. His torch went out, and he had to stop and rummage in the pack for another battery. Maybe in another hundred years they'd have the little atom motors down cheap enough so an ordinary man could buy one. Out among the *snitt* weeds he heard the beetle-things scuttling busily along—at least, they hadn't been scared off. But there was no sign of any trail leading out of the crater. It had to be there, somewhere, because plain common sense said that, if the natives didn't come here for their *snitt,* they had to get it from the bugs some other place.

Across the crater Ape let out a yell. The big valver had traveled faster than he had. The call came again: "Hunt! Hey, Hunt Martin!"

Clambering up on a low terrace that encircled the carter, Martin could see the spot of light from the other's torch. It took him a good fifteen minutes to reach the place. A river of little, glossy black bodies was streaming out of the tangled undergrowth, through a mass of tumbled rocks and up the cliff. Thousands of them—going and coming—making a stream ten or fifteen feet across. From the other side Ape hailed him.

"Geez! Look at 'em! Where they going?"

He swung the beam of his flash against the cliff. The creatures were disappearing into a crevice between two huge pillars of basalt. Its edges were glassy; it looked as though it might have been a volcanic vent, in the days when the crater was active.

Climbing out on one of the great blocks of fallen stone, he studied the beetles. There wasn't a great deal of external difference between them and Earthly insects—big scissor jaws, ten jointed legs, big glassy eyes that seemed to be made up of cylindrical lenses, and the rest. They had two sets of wings under hard black sheaths, with an uneven spot of bright gilt on the back of their heads. Most of them were carrying the little leaves slung over their heads with a great eye staring out on either side of the stem, and others had their mouth parts smeared with the purple gum. Whenever he kept the light on them for long they would set up that rasping squealing and clatter their wing sheaths menacingly.

Ape had found a way across the rocks, and together they climbed up to the hole in the cliff. The wind was quite strong over here, opposite the notch, and air was sucked into it with considerable force. Probably there was an outlet somewhere which made it a natural chimney. The crack went up fifty or a hundred feet, but the only part wide enough for a man to crawl into was at the base, where the stream of insect-things was entering. At that, they'd have to leave the packs outside.

There was a worried look on Ape Brennan's face as he surveyed the crack in the feeble light of dawn. He was a man who liked a lot of room, and the look of the thing gave him the blue-gonnies. Hunt Martin was jammed into it, headfirst, his skinny legs kick-

ing like a gutted mule's as he tried to edge himself up the slick throat of the vent. Ape shivered. You could be squashed flat in a hole like that and nobody'd ever know about it. You could get hung up some place and lie there starving, dying by inches, your tongue swelling up and the rats of hunger gnawing in your belly. Maybe the bugs would find you there—and you wouldn't have a chance against those glistening pinchers! He'd seen a man eaten by ants a tenth their size. Geez!

Martin's waving feet vanished. A shower of fine rock fragments came skittering down out of the darkness. Ape lay flat and peered anxiously into the hole. It was black as the space side of an asteroid. Martin's voice reached him, cramped and muffled:

"C'mon. I need help up here."

SWEAT made Ape's hands slippery as he stuck his head into the crevice. Somewhere ahead in the darkness he could hear the scratching sounds Martin made as he squirmed and wriggled for purchase on the glassy walls. Ape swallowed hard and pushed his head farther into the blackness. His shoulders hit, and he had to twist halfway over on his back before they would go in. He got one arm ahead of him and trailed the other behind, kicked for a foothold and drove himself ahead. It was pitch-black; he might as well have his head in a bag. It was stuffy, like in a small room that had been closed for a long time. It was hard to breathe.

Martin called again: "Flash your light up here. I'm caught on something."

Geez—the torch was in the wrong hand. He tried to bring his arm up, but there wasn't room. He tried to reach back with the other, but that wouldn't work, either. A little light filtered past him, and he could see a wider spot ahead. He inched along and found that he could roll the rest of the way over on his back and pass the torch up past his face. Then, with a tremendous heave, he twisted back and flashed the light ahead. Martin was about ten feet up the shaft, where the tunnel narrowed again. A button of rock had hooked into his belt. Brennan hitched ponderously ahead, reached up, and grabbed the other's ankle. There was a wild yell and Martin came sliding down on his head.

When the air cleared they tried again. Ape wedged his shoulders across the throat of the tunnel and Martin used his head for a stepping-stone. He got past the narrow spot and let down his belt. Ape grabbed it, and after a while he was up, too. The vent leveled off, and for a hundred yards they squirmed on their bellies like snakes, then it shot straight up and they had to try the ladder act again. Finally they came into a man-size corridor burned through the black stone. It was slippery, but they could walk upright, and Ape breathed a huge sigh of relief.

They turned a corner and there was light! Martin, ahead, doused his torch. Peering past him, Brennan stared into a vast expanse of blackness full of glittering phantoms of light that jumped and flickered every time he moved. There was a vague grayish glow from somewhere beyond, that seemed to be reflected from a thousand tiny facets, strewn through the darkness. And there was an acrid, stifling odor and a low, husky whispering that brought his hair up on end.

The two men tiptoed forward. Suddenly Martin's head dropped out of sight. There was a crash, a dry rustling, the tinkle of countless crystal grains, and then that shrill rasping that the damn bugs made! Brennan ducked as the air was suddenly filled with buzzing, blundering shapes that struck stingingly against his bent head and caromed off into the darkness.

THE TURMOIL died away and Ape's light found Martin a dozen feet below on the cave floor, buried up to his neck in a pile of dead leaves. All around him towered crazy-angled spires of glittering crystal, like wind-blown, frozen spray. His shoulder brushed one and it came crashing down on his head, shattering into a myriad of tiny crystal grains.

"You all right?" Ape inquired cautiously.

Martin cursed fluently. "You have eyes, haven't you?" He groped for a handhold and got slowly to his feet. "Stop gaping like a ninny-gam and get down here, if you can do it without breaking your damn fool neck!"

Ape was relieved. If Hunt could swear like that, he was O. K. He clambered gingerly down the sloping rock face to the floor of the great cave. It was like a huge bubble in the lava rock, and the beetles had lined it with their crystal lacework—stalactites and stalagmites, bridges and pinnacles, walls and screens and sparkling buttresses that blazed with a hundred colors when the light hit them. The creatures were everywhere—on the cluttered floor, clinging to the walls, scuttling over the ceiling. Their huge eyes glowed faintly like cats' eyes at night. And underfoot, covering the cave floor with a matted carpet out of which the crystal minarets rose dizzily, were millions of withered leaves and skeletons of leaves.

"So that's what they do with the glass." Martin rubbed himself ruefully. "Their jaws must be hard as all hell to crack it up that fine. I wonder where they get it all."

He crumbled a piece of the stuff in his fingers. The tiny, sharp-edged grains were cemented together with some hard, shiny substance. They were flattish and ripple-marked, almost as though they had been chipped by some prehistoric arrow maker. Pressure flaking, his college education said.

"Where's this *snitt* we was goin' to find?" Ape demanded. "I don't see

nothin' to get excited about in here."

"This is the place it came from, and this is the place we'll find it," Martin snapped. "Want me to shove it down your throat with a spoon? Come on!"

At every step some fairy tower toppled into ruin. It was impossible to move without crashing into one of the things, or crunching one of the beetles underfoot. As they progressed devastatingly toward the glimmer of light across the cave, the shrilling of the little creatures grew louder and angrier, and the buzzing rustle of their wings as they zoomed past within inches of their heads made Brennan's scalp prickle. He didn't like being cooped up underground like this. It was no place for a space-hog to die.

Martin stopped so suddenly that Brennan rammed headlong into his back. The towhead was standing like a post, his light out, staring intently into the gloom. His head was cocked, listening. Ape planted his legs unsteadily and listened, too.

He could see where the light came from, now. There was an arm of the main cave, maybe as big as the dining hall on one of the big space liners. The far end opened into the light, and the bugs had walled it off with one of their crystal screens, built up from floor to roof.

The whispering came from there. It was different from the noise the bugs made—soft and hushedlike—but he didn't like it any better. Martin was moving slowly forward now, step by step, and Ape followed, his own hoarse breathing drowning out the whispering. The other's flash came on, and he swung it up slowly. Ape heard him grunt, and blundered curiously forward.

THERE were heaps of the stuff—mountains of it—burning ruby-red against the shadows! *Snitt*—enough to dope every man on every planet in the Universe! Enough to drink up every piece of gold and scrap of silver and roll of platinum leaf under all the stars! *Snitt*—drifted into scarlet dunes, piled halfway to the fretted roof—and alive

with hideous, crawling, sulphur-yellow grubs!

They wallowed in it like hairy yellow moles. They were covered with it, little gems of the stuff burning in the spiky black fuzz that grew in tufts all over their many-sectioned bodies. They were mouse-size, rat-size—any and every size. As they crawled and burrowed and squirmed in the red wonder they crooned that whispering lullaby that made his spine bristle and his one eye twitched nervously.

Martin's light focused on them. The leaves were laid in blankets on the floor, larded thickly with the purple gum they had seen the beetle-things carrying. Grubs no bigger than a fingertip were feeding on them, glutting on the purple stuff, nibbling at the silver-patterned leaves. Eggs, like looped chains of orange opals, festooned them. Brennan's stomach turned over inside him as he saw the scarlet droplets that were oozing out of great pores in the grubs' sulphurous skins. *Snitt*—sweated out of worms!

Martin's hand grabbed his elbow. "Look . . . over there." The light picked out a gap in the crystal screen. It was low—less than man-size—but the natives that traded *snitt* didn't come much higher than a man's chin. That doorway clinched it. This was it! This was the place where all the *snitt* in the world came from, and he, Ape Brennan, was knee-deep in it!

He went down on his knees on the cave floor and buried his arms in the red dust, up to his elbows—up to his shoulders—brushing aside the squirming yellow horrors that wriggled up out of the scarlet drifts. He began pouring it into his pockets, into the front of his shirt. He let it ripple in long streamers through his spread fingers. Then, lovingly, luxuriously, he began packing it into his parched mouth, rolling it on his tongue and savoring its numbing tang, pushing it up under his trembling lips. This was heaven!

HUNT MARTIN had forgotten his companion for the moment. He was interested in what lay outside, on the other side of the crystal screen. Parts of the puzzle were slipping into place in his mind, but there were other pieces that still didn't quite match. He had had a hunch about the beetles from the time he saw that pile of *snitt* down by the rock where they'd broken the bottle. The stuff was a by-product of the creatures' normal metabolism, like honeydew on aphids, back on Earth. They ate the purple sap, or their grubs did, and secreted pure, ruby-red *snitt* from special glands in their skin. Maybe you could farm the things out, like silkworms, and have all the *snitt* in the world. It was an idea, anyway.

But there was that doorway. Natives gathered *snitt* to sell in Abaddon, and he was wondering why, with all these hills of the stuff at their disposal, they didn't sell more. Chances were the cave was packed with it, back there in the darkness. The patrol embargo didn't keep them off, but something else did, and he wanted to know what.

The cave continued for some distance beyond the screen. There was a pretty strong draft on his back as he moved cautiously toward the light. Probably this was the only outlet of the natural wind tunnel they had climbed up from the crater.

There was a sharp twist in the passage. Something beyond cast a sprawling shadow on the wall—something big and shapeless that did not move. Martin eased his gun out into his palm. He plastered himself against the wall of the tunnel and advanced step by step to that corner. He pushed his head slowly into the open.

The shadow was made by a statue that squatted on a kind of platform in

the middle of the cave mouth. There were dishes and bowls on the floor all around it, and flat, black baskets heaped with *snitt*. There were half a dozen of the spindle-legged little natives with their popeyes and pursed snouts down on their four knees in front of the thing, with tufts of bright cloth and feathers stuck to their naked, conical skulls. Priests or chiefs or something. He began to get a picture of why a few feathers would buy more *snitt* from a native than a handful of gold, and why there wasn't more of it traded out. The big shots of the tribe had a monopoly on the stuff, and it was good business to keep the price up and their god and themselves rich.

He suddenly noticed the god. It was a beetle—like the things in the cave—about ten feet high and carved out of the hard lava rock. Beetles—*snitt*—glass—it all made a kind of a pattern, the pattern he'd been looking for, only he and Ape Brennan were going to change it. Or were they? Would that be smart?

He never answered that question. The cave opened at the end of a gorge, narrow and high-walled, with mud huts scattered over its barren floor. There was a crowd of ogle-eyed natives standing there in their pot-bellied nakedness, goggling at the rigmarole their priests were going through. And there in the front row, towering head and shoulders over the tallest of them, was fat Joe Sligo!

Martin's light eyes went hard as ice. Sligo! It was the last piece he needed. Maybe the priests never would have sold the stuff if Sligo hadn't persuaded them to. As a matter of fact, he'd never seen or heard of a native taking *snitt*. Maybe they'd have poured it out like water, for any trinket a man wanted to offer, if Joe Sligo hadn't gotten a corner on the trade. Anyone who tried to change the way things were going would have to buck more than a tribe of spindle-shanked midgets. He'd have to fight Joe Sligo—and beat him!

MARTIN'S fingers itched on his gun. It was pretty far, but it might be worth trying. If he missed, the whole pack would be down on him—or would they? Maybe this cave was taboo to anyone but the big shots—the priests and chiefs. Maybe that was why Sligo was out there, looking in, instead of inside shoveling the stuff up in ton lots. Maybe the two of them did know something Joe Sligo didn't—the back door to this fabulous pleasure trove of illicit dreams!

His eyes glinted at the thought. *Snitt* soaked into the mucous membranes and acted almost at once on all the major nerve centers. It turned every sensation into sheer ecstasy. It brought dreams of marvelous beauty, of exquisitely perfect harmonies, of worlds where women were like angels out of heaven or devils out of hell, depending on how you liked 'em. He'd heard of sadist cults where the victims would writhe and moan voluptuously under the whips, full to the gills with *snitt*, filled with ecstasy at the most fiendish torture. There were nap joints where men lay stacked like logs on bare board shelves, dreaming away the days with open, rolled-back eyes and smiling lips. There were poems in the great libraries, written by *snitt* addicts; paintings on the walls of the great galleries, done by *snitt-happy* wretches who couldn't draw a circle when they were out of their dream. Pleasure—release—utter freedom; and he held the key to it all!

He slid back out of sight. The priests were done with their bowing and bumping; two of them were coming back into the cave. As he turned to run, a bellow of utter abandon rang out from the depths of the cave:

"Yeeeowhooo! Yeeeheee!"

Ape! The fool was in the *snitt!* He'd be tearing, howling mad with it —ready to fight anyone or anything— out for war with blood in his one eye. Fighting was the greatest joy he had, and *snitt* gave his every move the thrill of combat.

There was a clacking babble behind him. Martin looked over his shoulder. The two priests stood there staring. As he looked one of them whisked around and was pelting for the open. His gun snapped up and spoke; the priest went skating across the floor and lay in a warped heap against the wall. With one leap he had the other one by the throat and had dragged him behind the idol. He twisted one of the native's pipestem arms behind his bony back and buried a knee in his puffy belly. The creature's saucer eyes were milky with pain and terror.

"Ooowahooo!"

Ape Brennan stood at the turn in the tunnel. Blood ran down his bull neck where showering crystal had slashed him. He came striding down the tunnel, gun in hand, his good eye blazing, roaring at the top of his lungs. *Snitt* was spilling out of his pockets and dusting his matted hair. *Snitt* dribbled out of the corners of his grinning mouth. He saw Sligo there at the mouth of the cave and for a moment it stopped him. In that moment Martin clubbed his gun and swung hard.

Brennan went down in a heap on

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top of the little native. A blissful smile came over his ugly face as the dreams caught him. In a second he was dead to the world.

MARTIN peered cautiously around the base of the idol. The natives were drawn up out of gun range, staring hard at the cave. Joe Sligo was squatting on the ground in front of them, and he had his black box with the round quartz eye.

It was getting dark again, and the wind was rising. Martin could feel it on his back, sucking through the cave like a giant chimney. Outside it was whipping the feathers on the priests' bald skulls. With darkness he might be able to get back with Brennan into the shelter of the cave, but the exit on the other side would be blocked by the beetles, streaming out to fetch gum and leaves to feed their hellish grubs. With darkness, too, Joe Sligo could close in.

There was the native, too. Why he had snagged him, Martin didn't know, unless he had had some dizzy idea about using him for a hostage. Hostages didn't count for nits when you were dealing with Joe Sligo. It might be a good idea to push a fist through the creature's papery skull and throw him out for a challenge to the rest of the damned spider-leggers. He glared down at the half-dead midget, and his eyes narrowed suddenly.

Snitt from Brennan's pockets had spilled over the native's face. Where it fell, the dead-white skin had turned an ugly greenish yellow and raised in great welts. A few specks of the stuff had gotten into one of the creature's great round eyes, and the milky iris was turning black. The beaklike mouth was gaping in silent agony.

Snitt!

Hunt Martin's bluish eyes were icy-hard under their pale lashes. His face wore a nasty little smile, thin-lipped and venomous. So that was the way of things? What was one man's meat on this damned planet was another's

poison. What was unbearable pleasure to men like Ape Brennan was hellish torture to the natives of this stinking hole in space. *Snitt* to burn was what they had here. *Snitt* to burn!

He turned his head with the wind, listening. From the cave behind him he could hear the petulant whispering of the yellow grubs, the æolian soughing of the gale through crystal cornices. Inch by inch, keeping the idol between him and Joe Sligo's little box, he moved back into the shadows. His heel clipped against the wall; he was at the turn. Gathering his legs under him, he dived into the darkness, as Joe Sligo's ray zipped past him to splash a spot of sheer white heat against the lava rock.

He picked himself up; sprang to the corner of the wall and emptied his gun down the tunnel's length, then raced back into the blackness of the cavern. His shoulder crashed into the jamb of the narrow doorway, bringing the crystal barrier down in ringing fragments on his head. He felt blood hot and wet on his cheek as he knelt in the darkness, fluffing up a little pile of the dead, dry leaves. They were like tinder, and the wind was like a furnace blast. Curling his body over his cupped hands he struck a light. It went out. Cursing, he dumped the box of matches into the powdery heap, took careful aim, and blazed away.

There was an answering burst of flame. In an instant the leaves were burning. They blazed with a clear, white light, brightening up the entire cavern, sending crazy shadows scampering through the crystal lacework that crusted its walls. Driven by the wind, the flames swept across the floor toward the piles of *snitt* and the tunnel beyond. Shapes appeared in that opening, and he blazed away at them with the gun he had taken from Ape, and saw Sligo's ray scoring a fiery trail in the dry duff of the cave floor. Swell! The more the better!

The fire was in the *snitt*. Great, oily red clouds of it were boiling up as the heat of the flames vaporized the scarlet crystals. Addicts claimed that inhaling the vapor of the stuff made it more potent. If true, this party of his would be the most potent that any jag-happy dopey had ever been, in or out of a dream!

The natives were gone and Sligo with them. He wondered how much of the stuff the fat man could take. Chances were he'd never reach the open, but if he did, the smoke would suck down that narrow valley and blanket it with a reeking garnet fog that would eat into the fish-belly skin of every native in the place and turn it livid yellow.

THE PILES of *snitt* were still smoking when Hunt Martin started to pick his way toward the outer air. The cave had been gutted; what was left was trash—undigested, half-cooked purple gum—twisted, blackened things that had been grubs. The stench was terrible, and he gulped a hasty breath and raced for the open.

Bodies choked the outer cave—livid, contorted, spidery legs twisted in death agonies and blackened eyes staring. He'd wiped 'em out as effectively as if he'd mowed them down with Sligo's ray. Brennan was where he'd left him, behind the idol, sprawled over the blistered body of the dead priest. The big space-hog was snoring blissfully, his one red eye rolled up until only a bloodshot rim showed under its thick lid. What was rank poison to the natives was the meat he craved.

Martin picked the sleeping man up by the belt and dragged him along. Sligo was nowhere to be seen. A thick, reddish fog hung outside the cave, in eddies along the canyon walls where the wind didn't reach. Wisps of it trickled after him from the cave. It got in his lungs, and the world began to take on a de-

lightful golden hue. The bare, black rocks seemed to be sprouting lush green grass—grass like he'd known back home on Earth, as a kid. The sky was soft, bright blue and there were little fleecy white clouds swimming in it. The ground was like a deep, plush carpet underfoot. His toes sank into it with a feeling of utter comfort and satisfaction. Perfumed breezes, bearing the scent of apple orchards white with blossoms, brushed his blond hair caressingly.

Someone was coming to meet him along a path bordered with flaming roses, strewn with satiny rose petals, bowered over with twining birch boughs. A girl—slim, tall, dressed in a gown of diaphanous gauze that revealed far more than it hid. Red hair poured over her white shoulders, and her eyes were as green as cut emeralds, her lips like ripe, red cherries, her teeth milky pearls shimmering in the moonlight. She held out her arms to him, and there was a golden salver in her hands, heaped with rich, purple grapes, the soft bloom still on them, the dew beading them.

All the longing of years of loneliness burst into Hunt Martin's soul. This woman was his! Savagely he seized her, crushed her brutally to him—stared down into the evil, grinning face of Joe Sligo!

It was a dream—a damned *snitt* dream out of the smoke he'd breathed. He'd walked into the trap, smiling, yearning—but Sligo had been too smart. He'd wanted to be sure, to lure him closer and closer, until his needled ray could drill a neat black hole through Martin's quivering belly, slice a section out of his spine, and burn him into a crisp, curled cinder. That was Joe Sligo's way, and he'd been too sure of himself. He hadn't known what kind of dreams the white-haired man would have. He'd waited just too long.

Martin's feet trampled the black box that had dropped from Sligo's hands. His arms were around the man's pulpy body; he hurled himself forward, bearing him to the ground with a sicken-

ing impact. But there were muscles under that yellow fat. Sligo squirmed like a conger under Martin's body. One knee came up with agonizing violence and the towhead rolled over with a groan. The world spun before his eyes, with Sligo's leering face as the hub, and he drove his fist hard at that whirling mark, with every ounce of strength he had left.

He felt bones crunch; his fist was wet. The world was rocking slower and righting, though his legs were wabbly with pain. He stared at the bloody mask of Joe Sligo's fat face, at Joe Sligo's grinning mouth. He saw Sligo's fist, with eight inches of blue-gray steel clenched in it, swinging at his defenseless belly. He kicked out and saw the knife go flying; saw terror stand suddenly in Sligo's eyes and smacked that terror with his fist, hard; buried his other hand in the fleshy folds of a fat throat and drove his knee into a paunch like a sack of moist bran. His fingers were digging deeper and deeper; visions were flickering before his blurred eyes again—Earth and home; the old farm; mud pies kneaded out of heavy, blue clay down by the creek bank. He felt the moist clay between his fingers and squeezed it rememberingly. And then the dream swept him up completely.

APE BRENNAN opened his one aching eye and stared biliously at a lowering sky. What a hangover! *Snitt* didn't usually catch him like this—he must have taken enough to hop an elephant. But there had been dreams!

He couldn't remember all of them, but he'd never had dreams like them before. Red carnage! Blond women! Liquor that was nectar of the gods!

Hunt Martin stood spread-legged in front of the village of sprawling mud huts, mean as hell and glad of it, confronting a cringing, trembling little delegation of Sheolian natives. They were a sick and sorry lot—blistered and half blind—all that was left of two hundred-odd. The old master who had driven them was dead, but this new master with the white hair and the pale-blue

eyes was no improvement. Tears stood in their goggling eyes. A poor native's lot was hard where men were!

Brennan got gingerly to his feet. The world was still a little uncertain about what angle it wanted to take. Martin turned and regarded him coldly.

"Here, you speak their damned lingo. Tell 'em who's boss here. Tell 'em we'll smoke the living daylights out of 'em over a kettle of boiling *snitt* if they don't do what we say. Tell 'em we'll stew 'em alive in *snitt* if they breathe a word to anyone about what's happened here. Tell 'em to bring their priest or king or whatever they have left here to me, and then get out and leave us be."

Ape licked a furry tongue over swollen lips. His mouth tasted like he'd been eating caterpillars. Maybe he had. He essayed a clacking sound or two, and then began to stammer out a halting message. The little natives got down on their bony knees and struck their hairless skulls on the rock. One of them, with a few bedraggled feathers pasted to his peaked scalp, edged forward and came crawling to Martin's feet. The man set a foot on his skinny neck and pushed his beaked face into the dirt.

"I'm boss here—tell 'em that. You're boss with me. The *snitt's* ours, and anyone who comes near it gets his belly blown out. We'll give 'em guns for that. They've never had guns before. If their god wants some of the stuff, he can have it, but only what we say he gets. We're the guys that give him his orders, too. And if any leather-skinned son of a scorpion gets caught outside, peddling *snitt* without our say-so, I'll nail his hide to the wall of his own filthy hovel and make him stand in his bare bones and scrape it clean!"

Ape did his best to put that into Sheolian. The little king, if he was that, was quaking like a bowl of jelly. Martin sent him rolling over with a thrust of his foot.

"C'mon," he said curtly. "We're going to town."

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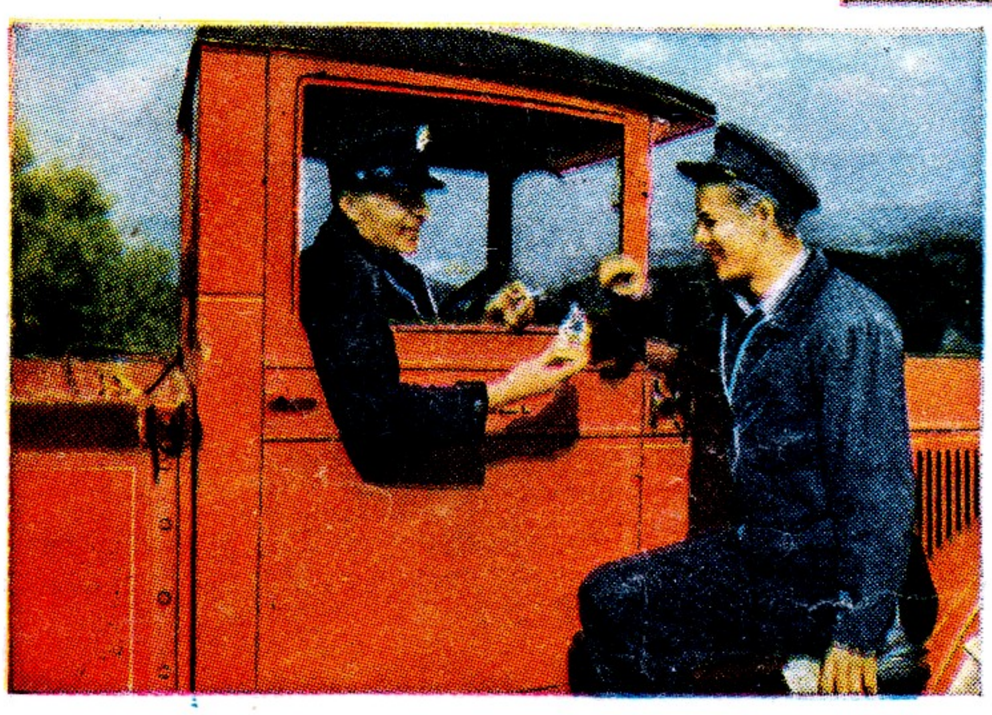
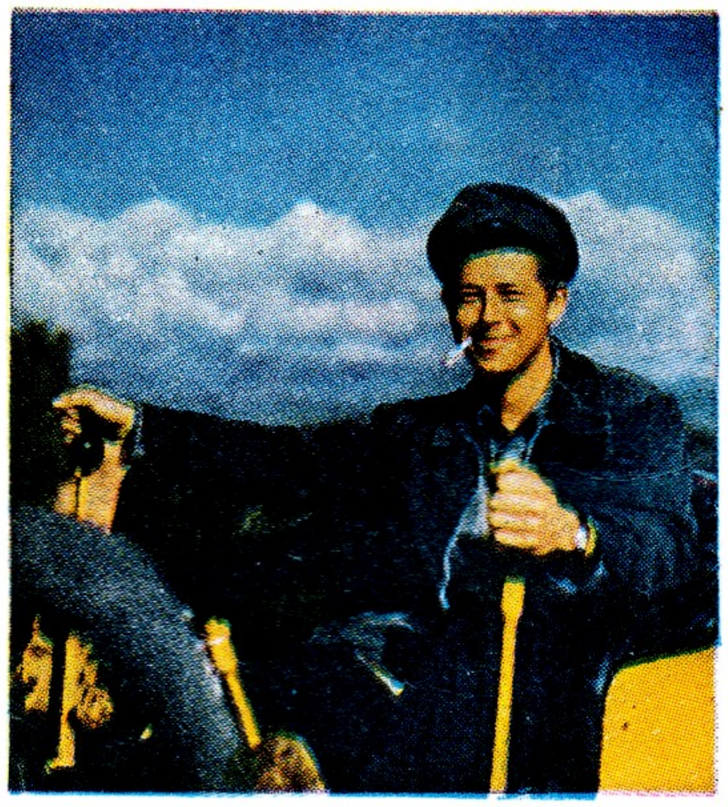
—H. L. McNichols of the California Mountain Fire Patrol

H. L. McNICHOLS works on mountain fire patrol in southern California—fights fire with a tractor. Last fall Patrol No. 2 caught the report: "A blaze along a 6-mile front!" "Mac" drove directly into the flames... time and again ... battled on 18-hour shifts for 5 days. No wonder fellows with tough jobs like to get the best of smoking pleasure out of their cigarette. "Camels are smoother, mellower," says "Mac." "They add a lot of enjoyment to living."

BUILDING A FIRE-BREAK. Operators of these powerful Diesel caterpillars are called "skinners." McNichols must negotiate treacherous slopes . . . as he handles this mighty machine that takes rocks . . . brush . . . trees in its stride at a steady ¼ m.p.h.



"MAC" chats with a fireman friend who shares his liking for Camels. "I'm sold on Camels and so are most of my friends," he says. Try Camels—smoke 6 packs and give your taste a chance to appreciate why Camels are the most popular cigarette in the U. S. A.



AT THE CONTROLS of 16 tons of ripping, tearing Diesel power: McNichols enjoys happy smoking on the job. Let up and light up a smooth, mellow Camel yourself, and enjoy a matchless blend of finer, more expensive tobaccos—Turkish and Domestic.

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